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A CYCLE
OF
CELESTIAL OBJECTS

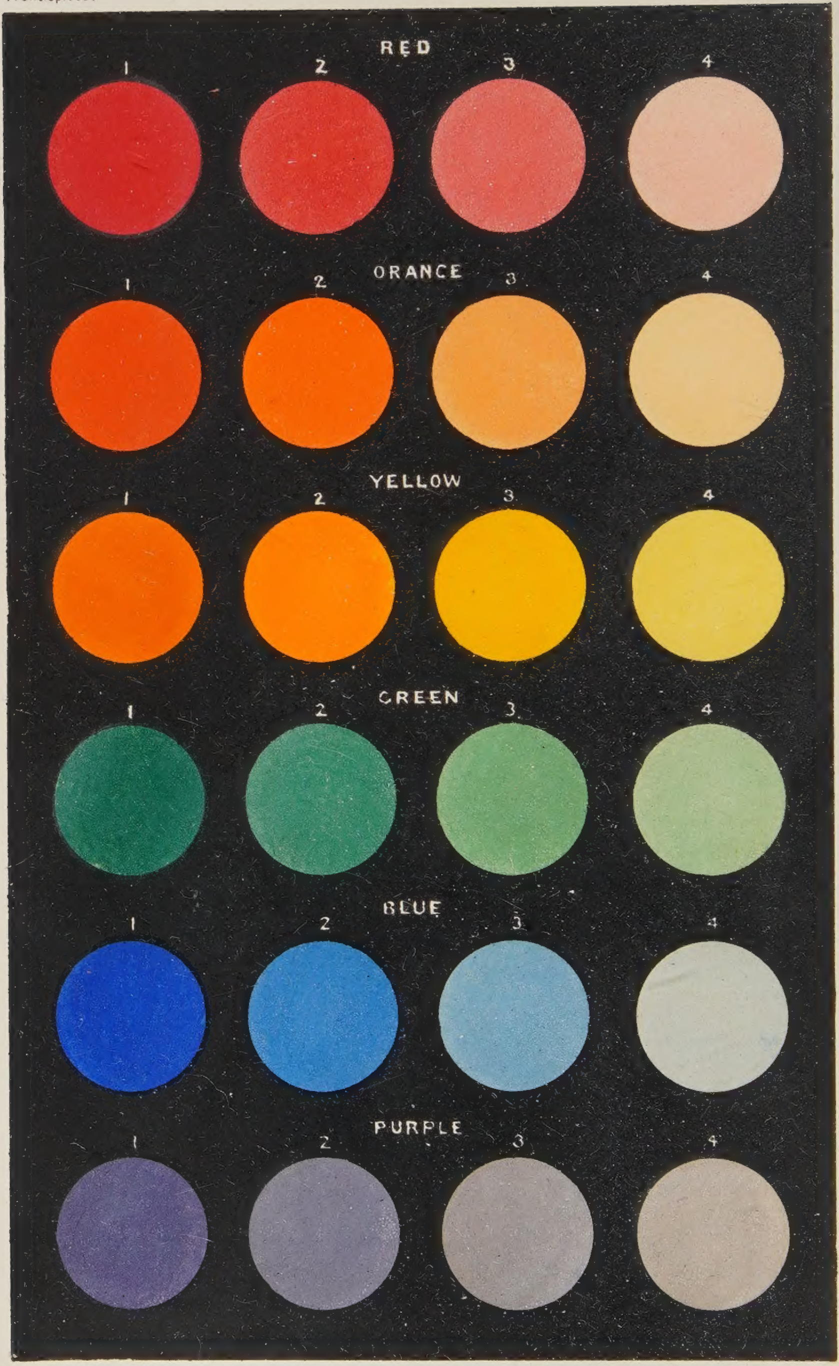
SMYTH AND CHAMBERS

London

HENRY FROWDE

OXFORD UNIVERSITY PRESS WAREHOUSE
7 PATERNOSTER ROW

Frontispiece.



Designed by W.H. Smyth

Vincent Brooks, Day & Son Lith.

SIDEREAL CHROMATICS.

C44

A CYCLE

OF

CELESTIAL OBJECTS

OBSERVED, REDUCED, AND DISCUSSED

BY

ADMIRAL WILLIAM HENRY SMYTH, R.N., K.S.F., D.C.L.

REVISED, CONDENSED, AND GREATLY ENLARGED

BY

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"A Digest of the Law Relating to Public Health;"
"A Digest of the Law Relating to Public Libraries and Museums;"
And other Works.

SECOND EDITION.

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1881.

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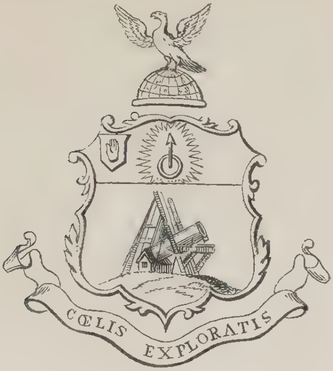
523.89
C44

[Original Dedication, 1844.]



TO

SIR JOHN FREDERICK WILLIAM HERSCHEL, BART.,
&c. &c. &c.

AS A TESTIMONY OF THE HIGHEST ADMIRATION AND ESTEEM;
A MEMORIAL OF LONG-CONTINUED FRIENDSHIP;
AND A GRATEFUL ACKNOWLEDGMENT OF IMPORTANT ADVICE
IN THE PURSUIT OF PRACTICAL ASTRONOMY:

AND AS A HEART-FELT TOKEN OF RESPECT FOR THE MEMORY OF
HIS EXCELLENT FATHER—WHOSE INDEFATIGABLE ZEAL,
NEVER-FAILING RESOURCES, DEPTH OF INQUIRY,
AND ALMOST UNRIVALLED QUICKNESS OF
CONCEPTION, HAVE RENDERED
HIS LIFE AN ERA IN
ASTRONOMICAL
SCIENCE—

THIS CYCLE OF CELESTIAL OBJECTS

IS MOST RESPECTFULLY INSCRIBED

BY HIS FAITHFUL FRIEND,

WILLIAM HENRY SMYTH.

PREFACE TO THE SECOND EDITION.

THE circumstances under which this edition appears are somewhat peculiar, and need a little explanation. Admiral Smyth's original *Cycle of Celestial Objects*, published in two volumes in the year 1844, was a book which attained a world-wide renown, and therefore naturally it passed out of print within a few years of its publication. Towards the close of his long and distinguished career the Admiral made various arrangements for the issue of a second edition by a very experienced observer, connected with him by ties of a special character. In Mr. Isaac Fletcher the book would have had as Editor an experienced observer, whose name would have been thoroughly acceptable to the astronomical world. Mr. Fletcher accepted the duty that was cast upon him, and during several years systematically collected materials for the revision of the work. In his hands, however, it made no great amount of progress, because in the year 1868 he exchanged in great part his scientific career for a political one by becoming Member of Parliament for Cockermouth. This had the not unnatural effect of hindering both observatory and literary work. Finally, his lamented death in 1879 put an end for the while to the prospect of any new edition of the *Cycle* being published under the supervision of the original Author's relatives or immediate friends.

It is no matter of concern to the public how it came about that the surviving representatives of Admiral Smyth eventually charged me with the interesting but serious reponsibility of publishing a new edition of the book. Suffice it then to state that in the autumn of 1879 I acquired the copyright of the work, all the original wood-blocks, and, what was of great value, all the MS.

notes, memoranda, private letters, and unpublished drawings collected by Admiral Smyth and Mr. Fletcher during the long period of 35 years.

I need hardly say that the labour of digesting these materials and of interweaving them with the print of the first edition has been great. It will be for the public to say how far it has been accomplished with success. I should never have embarked on the scheme had I not believed in the existence of a widespread desire on the part of astronomers to see issued a new edition of a book which without doubt powerfully stimulated a taste for Astronomy amongst amateurs in England during the quarter of a century following its appearance.

The programme which I set before myself was this:—so to revise, prune, and amplify Admiral Smyth's "Bedford Catalogue," as to provide a Telescopist's Manual for Refractors up to, say, 8 inches of aperture, and to embody the progress of the science up to 1880, just as the original edition might have been considered fairly complete for 5 inches of aperture up to 1845.

To carry out this programme involved a twofold task: (1) to cut down here, expand there, and revise everywhere Admiral Smyth's printed matter. This has been done in a very searching manner. (2) To compile from works relating to the Southern hemisphere a body of objects as nearly similar in general character as might be to those which Admiral Smyth had gathered together for the Northern hemisphere. This second branch of my duties has been carried out as well as I could do it, but I am far from saying that I am satisfied with the results. The reasons for this are easily found. The Southern heavens have not been explored in the persistent way in which the Northern heavens have been during the last half century, observers in the Southern hemisphere being few and far between.

These remarks are I think sufficient for the purposes of a Preface. In the Introduction will be found some more specific details as to the principles which have guided me in my revision, and as to the materials which have been made use of.

I have done nothing yet in the way of preparing a new edition of Admiral Smyth's first volume, which he designated "Prolegomena." It is at present an open question with me what to do as to that volume, I having already covered most of the ground which it occupies, and much more besides, in my own *Handbook of Astronomy*.

It is a pleasant task in bringing a book to an end to thank one's friends for assistance given. So much help has been generously afforded me from all parts of the world that I find it difficult to individualise the helpers. But two, and they strangers to me personally, and foreigners, stand out beyond all others; namely, Mr. S. W. Burnham of Chicago, U.S., and M. Jedrzejewicz of Plonsk in Poland. Mr. Burnham has not only furnished me with an almost inexhaustible supply of double star measures of great precision and late date, but he has read all the proof sheets and made innumerable suggestions. Of these some are being treasured up for a future edition, having come to hand too late for use in this one. M. Jedrzejewicz has supplied me with numerous measures of double stars, many of which were made as recently as 1880, and belong to objects often neglected by observers. They were therefore peculiarly acceptable to me as enabling me to fill up gaps, which otherwise must have remained for this edition unfilled.

I have only to add that I have done my best to secure accuracy in the printing of the book, and I trust that few errors of moment will be found to have crept in. I shall at all times be very glad to receive corrections and suggestions for the improvement of future editions.

G. F. C.

Northfield Grange,
East-Bourne, Sussex,
April, 1881.

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ADDENDA ET CORRIGENDA.

Page 3. No. **3.** The word "single" has been inserted by the printer in the wrong place. It should stand opposite the name BURNHAM. Doberck's angle seems obviously erroneous.

" 4. " **7.** Add :—Burnham 169·9° ... 7·8″ ... 1880·59

" 6. " **12.** Add :—Burnham 95·8 ... 0·71 ... 1880·59

" 10. " **24.** Add :—Burnham 82·3 ... 27·5 ... 1880·58

" 11. " **26.** Add :—Burnham 223·2 ... 6·8 ... 1880·59

" 20. " **42.** Add :—Jedrzejewicz 159·9 ... 5·3 ... 1880·14

" 22. " **46.** Add :—Jedrzejewicz 359·5 ... 1·37 ... 1880·10

" 22. " **47.** Add :—Burnham 327·3 ... 432 ... 1880·60

" 23. " **48.** Add :—Burnham 116·9 ... 38·3 ... 1878·67
There is an excessively faint star of mag. 13 nearer than Smyth's discovered by Burnham. Pos. 314°; Dist. 37″; 1878·67.

" 28. " **61.** *Dele* "Burnham says" &c.

" 30. " **64.** Add :—{Wilson & Seabroke} C D 341·5° ... 22·3″ ... 1874·40
C D is Σ. 101.

" 30. " **65.** Add :—Russell 0·4° ... 5·6″ ... 1880·40

" 30. " **66.** The Decl. should be 57° 44·9′.

" 31. " **68.** Add :—Dembowski 349·9° ... 52·4″ ... 1874·80

" 36. " **73.** Add :—Jacob 125·6 ... 9·7 ... 1846·90

" 36. " **75.** Add :—Dembowski 99·1 ... 69·2 ... 1874·40

" 37. " **78.** The star mentioned here is that given as No. 77.

" 40. " **85.** A very faint star of mag. 14 or 15 has been seen by Hall. Pos. 63°; Dist. 22″; 1876·00.

" 41. " **88.** Add :—Burnham 32·1° ... 11·4″ ... 1878·21

" 43. " **94.** *For* Σ. 151 *read* Σ. 153 and add :—
Burnham 67·8 ... 7·8 ... 1880·61

" 43. " **95.** Add :—Stone 59·0 ... 4·8 ... 1877·85
Burnham 61·1 ... 4·3 ... 1879·03

" 45. " **100.** Add :—Gledhill 195·2 ... 3·3 ... 1873·90

" 46. " **103.** For the star presumeably Smyth's B, Burnham's figures should be :— 172·8 ... 308·0 ... 1879·75

" 47. " **104.** Add :—In Pos. 84°; Dist. 223″; 1878·70 there is a 9th mag. star which Burnham finds to be a close double, Pos. 27°; Dist. 1·5″; Epoch 1878·01. The companion is of about the 12th or 18th mag.

" 53. " **119.** Add :—Jedrzejewicz BC 94·1° ... *oblong* ... 1880·12

" 60. " **133.** The observer's name is left out; it should be SMYTH.

" 64. " **138.** The angle of AB is *decreasing*, not increasing.

" 73. " **162.** Add :—Burnham {A C 268·3° ... 67·0″; C D 116·0 ... 5·0} ... 1878·15
C is of mag. 10 and D of mag. 12. The duplicity of C was discovered by I. W. Ward of Belfast. Burnham notes that there is a 13th mag. star about 20″ from C in the direction 228°.

" 230. " **533.** *For* "white" *read* "wide."

" 253. " **595.** The precession is Decl. should be 15·49″.

" 285. " **679.** Add :—Hunt 203·5° ... 384·9″ ... 1881·12

" 348. " **849.** Add :—Russell 181·3 ... 1·39 ... 1880·44

" 410. " **981.** Add :—Russell 185·0 ... 5·5 ... 1880·44

" 422. " **1006.** Add :—Russell 189·3 ... 0·90 ... 1880·44

" 511. " **1216.** *For* "Difference of R.A." *read* "Distance."

" 555. " **1303.** Add :—Russell 53·1° ... 1·15″ ... 1880·45

" 642. " **1513.** *For* "Σ. 802" *read* "S. 802."

INTRODUCTION.

The many English observers who during the last thirty odd years have been familiar with Admiral Smyth's method of arranging his materials, will find that in the formation of this large extension of the "Bedford Catalogue" I have proceeded as closely as possible on the lines laid down by my predecessor. This new edition, though the materials are fused into a consecutive series of objects arranged in strictly regular progression through the 24 hours of Right Ascension, comprises two essentially distinct masses of matter, namely, (1) Admiral Smyth's own objects with his notes thereon, and (2) my additions with my notes thereon. The Admiral's historical, antiquarian, and scholastic remarks on everything which could possibly be used as a peg for such remarks constituted a striking and attractive feature which I have retained more or less intact, but have made no attempt to imitate. It follows therefore that the objects selected by me have few annotations, and those only of a purely astronomical character.

In dealing with Admiral Smyth's objects I have done my best to revise every item of information; to strike out passages which were quite erroneous or out of date; and to bring up to date every statement which needed such treatment. I have omitted here and there non-astronomical comments the space occupied by which I thought might be more profitably utilised, and I have struck out altogether a few objects which seemed to me devoid of interest to those for whom this work is primarily intended. Perhaps I might have done well to have struck out a larger number of objects. This is a matter which will be taken into consideration hereafter.

The additions which I have made have been selected with the idea in my mind that the Admiral had omitted a large number of Herschelian clusters and nebulæ and Struvian double stars which undoubtedly deserved a place in these pages. I have likewise added a certain number of isolated objects which seem particularly to deserve the attention of amateurs, such as remarkable coloured stars, and remarkable variable stars. These additions have greatly enlarged the scope of the original Catalogue. But its extent has been still further augmented by reason of the fact that I have brought within its range the whole of the Southern Hemisphere, selecting Southern objects as nearly as possible on the footing on which I might presume that Admiral Smyth would have proceeded had he ever tried to compile a Southern "Bedford Catalogue," so to speak.

These additions have involved a vast amount of thought and labour, and I am very far from confidently asserting that the results will prove wholly satisfactory. The fact that I have had to make my selection without any personal knowledge of the objects themselves, and without the advantage of any help from observers who have seen them, has rendered my labours necessarily difficult. Nothing would afford me greater pleasure than to be brought hereafter into communication with a few observers in the Australian Colonies, for instance, able and willing to furnish me with the means of revising and improving my selection. But it is not alone in the matter of selection that some Southern help is needful. There has been practically no Double Star work carried out on the other side of the globe since Sir John Herschel's sojourn at the Cape from 1834 to 1838. The consequence is that such a thing as a well-observed Southern binary does not exist. Indeed, as regards double stars, there are an immense number in the Northern hemisphere which have been entirely neglected. It is a matter for regret that what few double star observers there are in England should so generally devote their energies to the unnecessary multiplication of observations of stars which do not very urgently need to be observed. I have done my best to ransack all the published sources of information relating to double stars and nebulæ, and I hope it will be found that few modern details respecting these which have been made public of late years and which deserve record in such a book as the present have escaped my notice. The number of works which have been consulted in the preparation of this volume is so great, that it would be hopeless to attempt to particularise them.

In selecting my additions, I have as regards the double stars commonly limited myself to objects whose principal component was at least as bright as the 7th magnitude, the companion being at least as bright as the 10th magnitude and the distance under 30″; but a departure from these restrictions has occasionally been deemed expedient. In the case of clusters and nebulæ I have rarely taken any object not marked by Sir John Herschel as at least "p B," meaning "pretty bright." But I have sometimes departed from this rule where an object was stated by him to possess some specially remarkable features, or happened to be one of those included by Sir W. Herschel in his Class I, "Bright Nebulæ," or Class V, "Very Large Nebulæ."

Some miscellaneous improvements have been introduced into the book which I trust may enhance its usefulness. For instance, in the case of all the nebulæ the reference number of Sir J. Herschel's *General Catalogue* published in the *Philosophical Transactions* for 1864 is given, but I have not made a corresponding use of Sir J. Herschel's *General Catalogue of Double Stars* published in vol. xl. of the *Memoirs of the Royal Astronomical Society*, for the reason that its numerous deficiencies render it of little or no value. It is a great pity that the Society, when spending its money on what was intended to be a general and complete Catalogue of Double Stars, did not make it such by finishing Sir J. Herschel's MS. instead of printing it in an unfinished form.

The places of the objects have been for the most part taken from Smyth, or from Sir J. Herschel's 2 Catalogues of Nebulæ and Double Stars; they have been brought up by myself to the year 1890, and have approximate precessions for 1890 appended thereto. In certain cases the calculations were performed for me by Mr. W. H. St. Q. Gage, F.R.A.S., of Exeter College, Oxford, but I have gone over all the calculations myself, and have no reason to fear that any important errors have crept in. In certain instances where better places were at command than those obtainable from the sources named above, I have availed myself of such better places, but I have not deemed it worth while to indicate them except in these general terms.

In designating the objects, I have in all cases followed Admiral Smyth in respect of his own objects, except in one or two instances in which he had clearly made mistakes. In designating my additions, I have taken Greek letters in all cases where a star was known by a Greek letter. I have next given the preference to Flamsteed's numbers; then to Lacaille's numbers: besides which there are a few reference numbers from other Catalogues, such as the "Brisbane," the "B.A.C.," "Birmingham's Red Stars" (*Scientific Trans. Roy. Irish Acad.* vol. xxvi. 1877), and so on. Nebulæ which had been classed by Sir W. Herschel are given with his Classes and Numbers. Nebulæ first observed by Sir J. Herschel are given with his numbers (with the letter **h.** attached) as published in the *Philosophical Transactions*, 1833, and the *Cape Observations*. Nebulæ observed at Parsonstown and included in the very valuable and interesting Catalogue lately published by the present Earl of Rosse in the *Transactions of the Royal Dublin Society* have an old English 𝕽 appended, in the title line of each entry. The Parsonstown notes should be studied by all possessors of large telescopes who devote their attention to nebulæ.

In selecting measures of Double Stars for insertion in this work I have endeavoured to exhibit results separated by tolerably equal intervals of time when the materials for doing so existed. Other things being equal, the interval chosen has been 10 years, but strict adherence to this plan has frequently been impossible.

Of all matters with which I have had to deal, that of the magnitudes of the stars has been the most troublesome by far. In many cases I have retained Smyth's magnitudes because I found them; yet, also in many cases, I have altered them where it appeared on sufficient evidence that they were flagrantly erroneous. Smyth's magnitudes are for all the larger stars taken from Piazzi. Magnitudes substituted for Smyth's are generally given within brackets. A word must be said about the magnitudes of the additional objects. In the case of double stars selected from Struve I have often disregarded Struve's magnitudes, altering them by means of Mr. Knott's well-known Table, which I here subjoin.

SMYTH.	STRUVE.	SIR J. HERSCHEL.	ARGELANDER.
6	5·7	6·4	5·9
6½	6·3	7·0	6·4
7	6·5	7·4	6·8
7½	6·9	7·8	7·5
8	7·4	8·2	8·0
8½	7·9	8·8	8·6
9	8·3	9·5	9·0
9½	8·9	10·1	9·4
10	9·3	10·4	9·4
11	10·0	11·3	10·0
12	10·4	11·7	10·6
13	10·7	12·5	11·2
14	10·9	13·3	11·8
15	10·9	14·5	12·4
16	10·9	15·9	13·0

Sir J. Herschel's magnitudes in the case of his Southern Doubles

I have left very much as I found them, except that where he has assigned different magnitudes on different nights as recorded by himself I have often taken a mean.

In regard to star magnitudes generally, it is much to be wished that astronomers could be brought to agree on some philosophical method of estimating them based in some way on direct photometric experiments. The system proposed by Dawes * has much to recommend it, and I wish that a few influential observers would combine and try further experiments with a view to its general adoption. Struve's notation is objectionable on two grounds: (1) its arbitrary basis, viz., *his* telescope, which has since been distanced by many others; (2) its decimals, which give a sham appearance of minute precision which is quite unattainable in a general way. For instance, who can distinguish between a star of mag. 10·7 and one of mag. 10·8?

As regards the colours of the components of double stars, I have usually retained those given by Smyth, notwithstanding that they are often very fanciful, and often defined with undue minuteness. Here, again, system is wanted, and Admiral Smyth's endeavour, by publishing his book on *Sidereal Chromatics* in 1864 to introduce method, deserves more encouragement than it appears to have received. At the risk of seeming presumptuous I will say that I think the illustrious Struve often went too far in his minute definitions of colours. Is not his terrible adjective *Olivaceasubrubicunda* a justification for saying this?

Admiral Smyth made use of various abbreviations to indicate the names of observers. Such as I found I have in many cases retained, but I have endeavoured to dispense with them as much as possible. The following Table may here be given, but of course it does not include a great number of simple abbreviations in every day use in observatories. A very full list of these will be found in my *Handbook of Astronomy*.

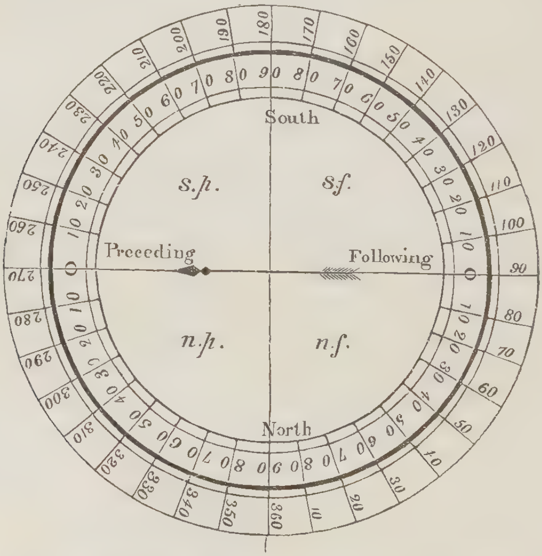
In the *Cycle*:—

Bris. = Brisbane Catalogue of Southern Stars.
H̥. = Sir W. Herschel.
h. = Sir J. Herschel (nebula).
*h. = Sir J. Herschel (double star).
H. = Sir J. Herschel, *General Catalogue of Nebulæ*, 1864.

* *Monthly Not.*, vol. x. p. 187, June 1851; vol. xii. p. 80, Feb. 1852; vol. xiii. p. 277, 1853.

Lac. = Lacaille, Catalogue of Southern Stars.
M. = Messier.
P. = Piazzi.
ℜ. = Earl of Rosse, *Observations of Nebulæ*, 1848–78.
Σ. = F. G. W. Struve.
O. Σ. = O. Struve.
B. = Bode.

In the case of Double and Multiple Stars the Stars are lettered with the letters of the alphabet, the brightest being called A, the next B, the next C, and so on. But in some cases where a pair of Stars have long been familiarly known by these letters and a very minute companion has afterwards been detected close to A or B &c., such companion is designated little a, little b, &c. As a reminder to Double Star observers of the way in which angles of position are noted by astronomers the following woodcut will be useful:—



It should be remarked that the outer circle, which is graduated from 0° to 360°, represents the method of recording angles of position of Double Stars now universally employed. Within this circle however the circumference of the block is divided into 4 quadrants of 90° each, according to the system adopted by Sir W. Herschel but abandoned about 1830 at the instance of his son, in consequence of "the continual and most annoying mistakes" which in practice were found constantly to occur under the system of reading by quadrants.

For the convenience of those who are disposed to take in hand the work of Double Star observations I give on p. xxiii the observatory form of registry used by Mr. Fletcher, but borrowed by him from Admiral Smyth, who in turn copied from Sir J. Herschel *.

I have not made any attempt to supply illustrations of the objects given in this work beyond reprinting such as came to me from Admiral Smyth. Perhaps however if I receive encouragement to do so I shall give in future editions a further number of woodcuts. But it must be borne in mind that the delineation of clusters and nebulæ by means of wood engravings is rarely attended with accurate and satisfactory results. By way however of affording some help to the reader in regard to this subject, I have in all cases given references to tolerably good published engravings †, so far as they are included in the list prefixed by Sir J. Herschel to his *General Catalogue* in the *Philosophical Transactions* for 1864, as extended by Dreyer in his valuable *Supplement*, published in the *Transactions of the Royal Irish Academy*, 1878. I have already made some allusion to the fact that the present Earl of Rosse has lately published in the *Transactions of the Royal Dublin Society* a very valuable and interesting series of Notes, accompanied by rough woodcuts, of an immense number of clusters and nebulæ re-observed at Parsonstown between 1848 and 1878, embodying and superseding the Notes published by the late Earl of Rosse in the *Philosophical Transactions* for 1844, 1850, and 1861.

In dealing with the Southern hemisphere, so far as for my purpose it was necessary to meddle with names of stars and boundaries of constellations, I have followed as closely as possible the B.A.C. and the Maps of the S.D.U.K. I had at one time thought of revising everything connected with the uranography of the Southern hemisphere on the lines sketched out by Dr. Gould in his *Uranometria Argentina*, published at Buenos Ayres in 1879, and I procured a copy for the purpose, but this was found likely to prove a task of greater labour than I cared to undertake, at any rate until I saw how Dr. Gould's ideas as to the Reform of the Constellations were received by the astronomical world generally. Dr. Gould's remarks by way of criticism on the names and boundaries of Constellations and on the lettering of conspicuous Stars, which will be found in Chap. iii. of the 4to. volume belonging to the *Uranographia Argentina* already alluded to, pp. 48–79, are very forcible in their way, but his endeavours to build up a substitute for what he would pull down have like many "Reform" efforts landed him in a very ocean of confusion. Dr. Gould's uranographical experiences might have been very serviceable to me if I could have found my way about through his Notes in Chap. v. of the said book. I made many attempts to do this, but the labour was so great that I shrank from it. The constellations having been cut up into slices and pieced together again in all manner of ways by the enterprising Doctor, were next printed page after page in no visible order whatever, either alphabetical or meridional; moreover many of the stars having been re-lettered, the difficulty of finding any particular star in what Dr. Gould calls his "Catalogue" is absolutely herculean. But I did not so much want to refer to the "Catalogue;" I wanted rather the "Notes" which are printed in another part of the book, and therefore even when after much trouble a star was found in the "Catalogue" it was a matter of some minutes more to dig up the "Note." I leave the reader who may have access to a copy to judge of the time it would have taken me to have collated all my Southern objects with the *Uranometria Argentina.*

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* *Memoirs R. A. S.*, vol. v. p. 92.

† The reader should here be reminded that all Sir J. Herschel's own engravings of clusters and nebulæ are not only inverted but are reversed right and left, owing to their having been drawn with the observer placed '*front-view*'-*wise* to the telescope.

On the subject of the Southern constellations generally I will give here an extract from a letter dated Sept. 8, 1880, which I received from Mr. E. J. Stone, now Radcliffe Observer, but who, as is well known, was at the Cape for some years. I had consulted him as to the nomenclature of the Southern constellations, intending to follow as well as I might be able any advice he gave me. Mr. Stone said:—"I have practically followed the B.A.C. in my nomenclature. Baily followed Herschel's advice after Herschel found that no sweeping changes in Lacaille's system would be acceptable." Stone in effect said, "Meddle not with him that is given to change,"—and this conservative idea so warmly commended itself to me that I have implicitly acted upon it.

Number for Reference.	Right Ascension.	Decl. N.P.D.
N°		
Instrument used.	Date.	Star's Name.
	18 = 18 · (dec. of year)	
Diagram.	Quadrant.	Magnitudes. Colours.
		A = B = C = D =
Face to	Microm.	

Position.	Distance.	Remarks.
Power. ° dec. W	Power. Rev. Pts. dec. *w*	
	N.B. The + and − readings to be taken alternately. + + + + + − − − − −	
Mean Z =	Sums { + − Div. by Parts = Seconds =	Sky Wind Steadiness Definition of Star Sid. Time of Obs. General Judgment of Obs. { Pos. Dist. Observer
from *n* in direction *nfsp*		

Zero of Position.	Determination of Place.
Star runs along the position wire at } ∴ Zero for position Z =	h m s Clock (or Clock + 24^h) + Hour Circle, + if East − West; if read on to 24^h, always − } Instrument Correction True R.A.
Computation of Distance.	° ′ ″ Declination Circle, + North − South } Instrumental Correction True Declination

A CYCLE

OF

CELESTIAL OBJECTS.

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1. 39 ♅. I. CASSIOPEIÆ. (Σ. 3062.)

	h.	m.	s.			s.
R. A.	**0**	**0**	**28**	Prec.	+	3·06
	°	′				″
Decl. N	**57**	**49·2**		——	N	20·06

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	87·5	...	0·82	...	1831·71
Dawes	193·4	...	0·95	...	1841·86
Mädler	237·0	...	1·16	...	1851·18
Dembowski	263·6	...	1·48	...	1862·73
Dembowski	283·9	...	1·39	...	1871·55
Burnham	303·4	...	1·57	...	1880·57

A binary star in rapid movement. A 7, yellowish white; B 8, bluish. The period is at present uncertain. Mädler, 146^{y}; Schur, 112^{y}; Doberck, 104^{y}. The eccentricity of the orbit is smaller than usual with binary stars. Schur puts it at 0·5. Close to Σ. 3057 and not far from β Cassiopeiæ.

2. α ANDROMEDÆ. (Σ. 13 App. II.) I.

	h.	m.	s.			s.
R. A.	**0**	**2**	**41**	Prec.	+	3·07
	°	′				″
Decl. N	**28**	**29·2**		——	N	20·06

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	259·4	...	55·5	...	1781·56
Dawes	264·2	...	65·5	...	1830·68
Smyth	266·9	...	64·8	...	1837·74
Burnham	272·0	...	70·2	...	1879·19

A *Nautical Almanac* star, with a minute companion. A 2, white; B 11, purplish.

The increase of angle and distance in this object may be charged to the *sf* movements of the large individual in R.A. and Decl., with an allowance for errors of operation in so difficult a star.

[" Rectilinear motion."—*Gledhill.*]

The extensive northern constellation of which this star is now the lucida, was one of the old 48 asterisms, and its components, as optical means advanced, have been thus registered:

Ptolemy . . .	23 stars.	Hevelius	47 stars.
Bulialdus . . .	26 „	Flamsteed . . .	66 „
Bayer	27 „	Bode	226 „

Andromeda is conspicuously figured near her father, mother, and lover, in the bonds which Aratus says she carried to Heaven; and has been also designated *Virgo devota*, *Mulier catenata*, and *Persea.* The Arabians, whose tenets prohibited their drawing the human figure, represented her as a sea-calf: but the principal star was called Sirrah, and Alpherat, from *Sirrat-al faras*, the horse's navel, it having formerly been quartered on Pegasus, whence it was taken to decorate the tresses of the lady. Warm imaginations perceive a resemblance to chains, by drawing the eye from 51 and 54 of Flamsteed, on the lady's left foot, over χ between the feet, to τ on the right calf; and from Alamak on the right foot, through χ and ξ to φ on the left knee. Owing to the derangements which the inadvertence or ignorance of the celestial map-makers have occasioned, there is no little confusion in this particular, for Flamsteed's Nos. 51 and 54 Andromedæ are φ and υ Persei, though placed exactly where Ptolemy wished them to be—on the lady's foot: so also α in this asterism has been lettered δ Pegasi by Bayer, and β has been the lucida of the Northern Fish.

Sirrah is useful in alignment, or the mode of finding from a few stars with which a spectator is familiar, others which are unknown to him. Thus, an imaginary line drawn from the belt of Orion, which all the world knows or ought to know, through Aries, will lead to the head of Andromeda. Certain brackish rhymes then state:

And on, from where the pinion'd maid,
Her cruel fate attends,
Wide o'er the heavens his fabled form
Wing'd Pegasus extends.

From Alpherat down to Markab's beams,
Let a cross line be sent,
Then will four stars, upon the horse,
A spacious square present.

Of this notable square, Alpherat (α Andromedæ) and Scheat (β Pegasi) form the northern side, while Markab (α Pegasi) and Algenib (γ Pegasi) mark the southern; and these are useful in extending the alignment to other sought objects.

3. 316 B CEPHEI. (Σ. 2.)

R. A. 0h. 3m. 13s. | Prec. + 3·07s.
Decl. N 79° 6′·0 | —— N 20″·06

	Position. °	Distance. ″	Epoch.
Struve, W.	341·5	0·81	1830·85
Struve, O.	338·4	0·74	1840·56
Secchi	324·9	0·38	1857·52
Talmage	295·6	0·30	1865·76
Doberck	315·8	*not stated*	1877·82
Burnham		single	1880·57

A very difficult double and ~~single~~ binary star. A 6½, yellow; B 7, deeper yellow. The angle is decreasing, and the distance after decreasing for many years is now perhaps increasing.

4. β CASSIOPEIÆ. II.

R. A. 0h. 3m. 18s. | Prec. + 3·10s.
Decl. N 58° 32′·6 | —— N 20″.06

	Position. °	Distance. ″	Epoch.
Burnham	324·6	297	1879·54

A bright star. A 2½, whitish; B 11½, dusky. This object is called Caph, from *Kaff-al-Khaḍīb*, the stained hand, a name from which a scientific friend supposes, that although now only the *lucida cathedræ*—or bright star on the couch-frame—one of the hands may have reached it in the earlier designs. But the Arabians applied the term *Kaff*, a flat hand, to the whole asterism, whose five brightest stars represented the thumb and fingers, coloured as if stained with henna, after the Oriental custom. This general name came to be fixed upon β.

A glance from the Pole-star to α Andromedæ, passes through Caph, nearly in mid-distance: or a line from between γ and δ, the following stars in the wain of the Great Bear, carried over the pole, strikes upon it, at a similar distance beyond Polaris:

> In yonder stars, which form a Cross, lo, Caph precedes the whole,
> A Cross more glorious than that which decks the austral pole.

5. 1 Birm. CASSIOPEIÆ.

R. A. 0h. 3m. 38s. | Prec. + 3·06s.
Decl. N 63° 20′·4 | —— N 20″·05

A red star of mag. 8½. Sir J. Herschel, "ruby;" Birmingham, 1873, "slight red;" Copeland, 1876, "deep red," 9.

6. 147 H̥. III. ANDROMEDÆ. (H. 9; R.) III.

	h. m. s.		s.
R.A.	0 4 17	Prec. +	3·09
Decl.	N 25° 17′·9	—— N	20″·05

	Position.	Distance.	Epoch.
Burnham	142°·9	63″·5	1879·57

A double star in a coarse cluster, occupying the spot where I looked for Sir W. Herschel's faint nebula. A 10, and B 11, both pale blue. It lies on the crown of Andromeda's head, and about 3° S. of α. I saw none of the nebulosity alluded to by Sir William in his registry of 1784,—but a perceptible glow in a tolerably rich and darkened field was indicative of nebulous matter. This part was followed by 3 principal stars nearly in a line at almost equal distances, and each with a companion *np*. The third being the smallest and closest, is here taken. Another double star follows in the upper part of the field at about 3^m Δ R.A.

[" There is a small star near B. Pos. 105°; Dist. 12″."—*Burnham.*]

7. 34 PISCIUM. (Σ. 5.) IV.

	h. m. s.		s.
R.A.	0 4 23	Prec. +	3·07
Decl.	N 10° 31′·9	—— N	20″·05

	Position.	Distance.	Epoch.
Struve, W.	162°·7	8″·03	1830·32
Smyth	165·0	7	1838·77

A neat double star. A 6, silvery white; B 13, pale blue; and they point to some small stars in the *sf* quadrant. This fine object, though numbered to Pisces, is astern of the leading Fish's tail, and near the wing of Pegasus; and 4° S.—a little preceding—the bright star γ Pegasi. From the delicacy of the *comes* it is so excessively difficult to measure, that I only mark a mean of careful estimations.

[" Probably fixed."—*Burnham.*]

8. 22 ANDROMEDÆ. V.

	h. m. s.		s.
R.A.	0 4 36	Prec. +	4·00
Decl.	N 45° 27′·6	—— N	20″·05

	Position.	Distance.	Epoch.
South B C	85°·3	5″·0	1825·99
Smyth B C	84·0	4·9	1838·92

A star leading to a distant pair. A 5, white; B 8, pale yellow, and C 9, bluish. A is in the Galaxy, between the left hand of Andromeda, and the head of Cassiopeia; and it may be fished up by a line through γ and α of the latter, at three times the interval between them in distance. It is here introduced as a pointer to the charming double star B C (=Σ. 3) in the *np* quadrant, on a line 351° and Δ R.A.=18s. It is in a fine field with several stars between the individuals. From measurements in 1783 by H̥., and in 1826 by South, it is clear that the position is stationary. H̥.'s distance was 3·5″, but as this was based on an allowance upon the apparent magnitude of the large star, no exact inference, as to change in this element, can be drawn.

9. γ PEGASI. VI.

		h.	m.	s.		s.
R.A.		**0**	**7**	**34**	Prec. +	3·08
Decl.	**N**		**14°**	**34′·3**	—— N	20″·05

	Position.	Distance.	Epoch.
Smyth	300°	181″	1835·07
Burnham	285·5	162·3	1879·54

A *Nautical Almanac* star, with a distant companion. A 2½, white; B [11], pale blue, with a small *comes* in the *sp*; a line from B carried through A, leads to two small stars in the *sf* quadrant. In Tycho Brahé's catalogue this is erroneously placed in the constellation Pisces; but it is on the extreme of the wing of Pegasus, whence it obtained the name of Algenib, from the Arabic *Jenáh-al-faras*, the horse's wing. A comparison of the distance between this star and Regulus, by ancient and modern astronomers, shows Ptolemy to be out −12′ 18″. To find this star by alignment, lead a line from the Pleiades through Aries, or look about 14° S. of α Andromedæ, where it will be identified by its lustre.

["There is a small star near B. Pos. 199°·3; Dist. 20″±."—*Burnham.*]

10. 35 PISCIUM. (Σ. 12.) VII.

		h.	m.	s.		s.
R.A.		**0**	**9**	**18**	Prec. +	3·08
Decl.	**N**		**8°**	**12′·6**	—— N	20″·04

	Position.	Distance.	Epoch.
Herschel, W.	148°·9	12″·50	1782·68
Smyth	150·1	11·6	1832·04
Dunér	149·5	11·66	1868·31

A neat double star. A 6, pale white; B 8, violet tint. This is a fine object. H̥. describes it as being in "lino austrino" of the constellation; but by the S.D.U.K. map, it is on the S. tip of the tail of the preceding Fish. A line from α Andromedæ through γ Pegasi, extended about 6° to the S., strikes upon 35 Piscium. There is no doubt as to its fixity.

11. 2315 h. PHOENICIS. (H. 27.)

	h. m. s.		s.
R. A.	0 9 31	Prec. +	3.03
	° ′		″
Decl.	S 39 49·5	—— N	20·4

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864: "v B; v L; vmi E; tri-N;" which means:—"very bright; very large; very much irregularly extended; tri-nuclear." In his *Cape Obs.* Sir John calls it "a very long irregular crooked ray with 3 nuclei, the second of which appears to consist of stars." He saw it to be at least 25′ long and 3′ broad. Engraved in *Cape Obs.* Pl. iv. Fig. 8.

12. 318 B. CEPHEI. (Σ. 13.)

	h. m. s.		s.
R. A.	0 9 57	Prec. +	3·23
	° ′		″
Decl.	N 76 20·0	—— N	20·05

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	124·0 ...	0·53 ...	1831·50
Struve, O.	125·5 ...	0·64 ...	1840·58
Secchi	102·2 ...	0·69 ...	1857·52
Gledhill	101·0 ...	0·5 ...	1873·91

A double star. A 7, yellowish white; B 7½, yellowish white. A decrease in angle seems certain; and O. Struve thinks that an increase in distance has taken place, but the measures of distance are so discordant as to make this latter idea very doubtful.

13. 38 PISCIUM. (Σ. 22.) VIII.

	h. m. s.		s.
R. A.	0 11 44	Prec. +	3·08
	° ′		″
Decl.	N 8 15·8	—— N	20·03

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	244·9 ...	4·0 ...	1782·68
Herschel, W.	235·4 ...	4·0 ...	1802·67
Smyth	235·9 ...	4·8 ...	1837·89
Wilson	239·7 ...	4·5 ...	1873·86

A very neat double star on the following tip of the preceding Fish's tail, following No. 10 nearly on the parallel. A 7½, light yellow; B 8, flushed white. This elegant pair was thought to be binary by its discoverer H., from his measurements.

H.'s observations appeared to give a retrograde motion, which subsequent astronomers have not confirmed. Those sage astrologers who dubbed Pisces a most malignant sign, ought to have contemplated this beautiful object: had this been done, every notion of stellar unpropitiousness and malevolence must have vanished.

14.

ι CETI.

IX.

		h.	m.	s.			s.
R. A.		0	13	50	Prec.	+	3·06
Decl.	S	9°	26′·1		—	N	20″·02

	Position.	Distance.	Epoch.
Herschel, J.	14°·2	45″	*not stated.*
Smyth	12	45	1838·82
Burnham	15·2	62·0	1879·87

A wide double star on the N. extreme of the tail; whence it was called *Dheneb Kaïtos shemálí*, the northern branch of the Whale's tail. A 4, bright yellow; B [11], deep blue. This is an excessively difficult object, being only discernible after long attention. The position and distance are therefore only the result of estimation. The companion is rated as of the 12th magnitude by Sir J. Herschel. There is a small star near the vertical, in the *sp* quadrant. The object may be found by a line carried through α Andromedæ and γ Pegasi, and extended to about 24° S. of the latter, where it will be seen as the N.E. apex of a nearly equilateral triangle formed by ι, η, and β Ceti.

15.

4 Birm. ANDROMEDÆ.

		h.	m.	s.			s.
R. A.		0	14	5	Prec.	+	3·14
Decl.	N	44°	5′·9		—	N	20″·02

A fine red star of mag. 8, first noted by Krüger as "Intensif roth.' (A.N., 1231).

16.

42 PISCIUM. (Σ. 27.)

X.

		h.	m.	s.			s.
R. A.		0	16	44	Prec.	+	3·09
Decl.	N	12°	52′·3		—	N	20″·00

	Position.	Distance.	Epoch.
Struve, W.	344°·9	31″·6	1828·76
Smyth	341·5	35	1833·95
Gledhill	338·1	29·0	1873·89

A delicate double star following γ Pegasi at about 2½° in the *sf* quarter. A 7, topaz yellow; B 13, emerald green. It is in the boundary, but not in the figure of the Fishes; and though not close, has an elegant aspect from the strong contrast of its colours in so barren a field of view.

["Rectilinear motion. The changes are probably due to the proper motion of the principal star."—*Gledhill.*]

17. 47 TOUCANI. (h. 2322; H. 52.)

		h.	m.	s.			s.
R. A.		0	19	9	Prec.	+	2·72
Decl.	S	72°	41′·6		——	N	19″·99

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; !!; v B; v L; vm CM;" which means:—"a globular cluster; very remarkable object; very bright; very large; very much compressed in the middle." In his *Cape Obs.* Sir John says:—"A most magnificent globular cluster. It fills the field with its outskirts, but within its more compressed part I can insulate a tolerably defined circular space of 90″ diameter, wherein the compression is much more decided and the stars seem to run together; and this part I think has a pale pinkish or rose colour." The diameter of the whole cluster, exclusive of stragglers, he puts at 6′ or 8′. In the cluster there is a double star of mag. 11. (Pos. 226°; Δ R.A. from centre of neb. = 6.5$^{\text{s}}$.) Gould says:—"Perhaps the most impressive object of the kind in either hemisphere; appears of the 4½ mag. to the naked eye." Engraved in *Cape Obs.*, Pl. iii. Fig. 1.

18. 22 h. CASSIOPEIÆ. (h. 22; H. 55.) XI.

		h.	m.	s.			s.
R. A.		0	21	0	Prec.	+	3·41
Decl.	N	70°	46′·9		——	N	19″·97

A large and straggling group of small stars, between the Lady's footstool and the knee of Cepheus; a line from the γ of one asterism to the γ of the other, and ⅓ the distance from that of Cepheus, hits 22 h. The place here given is that of a coarse double star, the components of which are of the 8½ and 11 magnitudes, both greyish, in the following portion of the mass; and which is, in a manner, insulated. It was first registered by Sir J. Herschel, and described as a very loose but pretty rich cluster.

["Merely a rich field of stars."—*Brodie.*]

19. 79 ♅. VIII. CASSIOPEIÆ. (h. 24; H. 63.)

		h.	m.	s.			s.
R. A.		0	23	45	Prec.	+	3·30
Decl.	N	59°	16′·9		——	N	19″·95

A loose cluster thus described in Sir John Herschel's *Catalogue* of 1864:—"Cl; v L; p R; l C; st 9 ··· 13;" which means:—"a cluster; very large; pretty round; little condensed; stars of mags. 9 to 13." The 9th mag. star here alluded to is in about the centre of the cluster. About midway between β and γ Cassiopeiæ.

20. 12 CETI. XII.

	h. m. s.		s.
R. A.	0 24 25	Prec. +	3·06
	° ′		″
Decl.	S 4 33·9	—— N	19·94

		Position.	Distance.	Epoch.
		°	″	
BURNHAM	AB	187·2	8·7	1879·89
	AC	110·2	212·9	

A triple star, or rather, a double one with a distant companion, above half-way in a line shot from γ Pegasi to β Ceti. A 6, topaz yellow; B 15, bright blue; C 11, dusky,—other telescopic stars in the field. This is a beautiful, but most difficult test object. It lies between the Whale's tail and the Southern Fish, nearly mid-distance of two stars to the *np* and *sf*, but trending towards the parallel,—the following individual being of the 11th magnitude, and the largest. Piazzi remarks: "Probably 11^{a} of Mayer, the sign of the declination being wrong, as in the 9^{a}, neither of which are found in a northern sky."

["B Visible in strong moonlight, 1866, with an aperture of $4\frac{3}{4}^{\text{in.}}$" —*Brodie.*]

21. 49 PISCIUM. (Σ. 32.) XIII.

	h. m. s.		s.
R. A.	0 25 4	Prec. +	3·11
	° ′		″
Decl.	N 15 25·7	—— N	19·94

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	107·7	13·2	1828·74
SMYTH	109·5	15	1835·87
GLEDHILL	106·8	16·4	1873·94

A delicate double star, *nf* γ Pegasi about 4°. A 7, silvery white; and B $10\frac{1}{2}$, cerulean blue. Though quartered in Pisces this very delicate object is actually between the wing of Pegasus and the right hand of Andromeda: and this, though a minor one, is among the many errors calling for a reform of the constellations. It is followed nearly on the parallel by a yellow star of the 7·8 magnitude, which must be the one alluded to by Piazzi in Note O. 92, though the distance is nearer 50 than 30 seconds. The companion to A is so minute as to vanish under the slightest illumination; the details are therefore merely estimated.

[The evident change is ascribed by O. Struve to the proper motion of A.]

22. λ CASSIOPEIÆ. (O. Σ. 12.)

	h. m. s.		s.
R. A.	0 25 41	Prec. +	3·25
	° ′		″
Decl.	N 53 54·9	—— N	19·93

	Position.	Distance.	Epoch.
	°	″	
STRUVE, O.	303·7	0·48	1844·84
STRUVE, O.	315·0	0·65	1870·18
DEMBOWSKI	318·7	0·57	1877·03
HALL	320·1	0·41	1879·10

A double star. A 6; B 6½. There is clear evidence of the angle having increased.

23. β TOUCANI.

	h. m. s.		s.
R. A.	0 26 30	Prec. +	2·78
	° ′		″
Decl.	S 63 34·0	—— N	19·91

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	172·2	27·7	1835·75

A double star. A 5; B 5. Described by Sir J. Herschel as a "superb object." A 7½ mag. star follows at 73^s and $3\frac{1}{2}'$ to the S.

24. 51 PISCIUM. (Σ. 36.) XV.

	h. m. s.		s.
R. A.	0 26 43	Prec. +	3·08
	° ′		″
Decl.	N 6 20·0	—— N	19·92

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	89·4	22·4	1782·68
HERSCHEL, J., and SOUTH	82·8	25·8	1822·87
STRUVE, W.	82·3	27·4	1833·20
SMYTH	82·5	27·6	1835·91
MÄDLER	81·0	28·2	1852·86
WILSON and SEABROKE	82·7	28·4	1873·86

A fine double star in a line about one-third the distance from γ Pegasi to η Ceti. A 6½, pearl white; B 9, lilac tint. This is in the centre of that part of the *kheïṭ*, or ribbon, of the sign Pisces which is near the tail of the preceding fish; and my observations for position and distance are highly satisfactory. A comparison with Ḥ.'s measures would indicate a sensible increase of distance between the two stars, as well as a retrocession of the orbital angle; but from the concordance of recent measures, it may still be questioned whether the position has not been stationary. Indeed, when we recollect that Ḥ. first classed these interesting objects, and made the instruments wherewith to grapple their details, we can only admire how well they stand such rigorous comparisons.

["A difficult star to observe. The angle has probably decreased."—*Gledhill.*]

25. 52 PISCIUM. XVI.

R. A.	$0^{h.}$ $26^{m.}$ $49^{s.}$	Prec. + $3^{s}·12$
Decl.	N 19° 41′·3	—— N 19″·92

	Position.		Distance.		Epoch.
BURNHAM	305°·8	...	38″·1	...	1879·57

A double star, between Andromeda's right arm and the back of Pegasus; and nearly midway of a line from γ Pegasi to ζ Andromedæ. A 6, fine yellow; B [12], deep blue. This is a delicate object. It is followed at about 12^{s} by a pale star of the 12th magnitude. The object was first discovered by Sir J. Herschel. Piazzi has remarked in his note on 50 Piscium, "cujus declinatio 19° 11′ (*Bradley*) omnino non invenitur:" and Baily has shown, in his edition of the "British Catalogue," that No. 50 does not exist, but that this star, No. 52, was the individual observed and registered by Flamsteed in 1692.

26. 28 h. CASSIOPEIÆ. (h. 28; H. 71.) XIV.

R. A.	$0^{h.}$ $26^{m.}$ $53^{s.}$	Prec. + $3^{s}·36$
Decl.	N 62° 40′·0	—— N 19″·92

	Position.		Distance.		Epoch.
SMYTH	228°	...	6″	...	1837·97

A neat double star in a cluster. A 10, and B 11, both pale grey. They are near the centre of an elegant and rich but somewhat straggling field of stars; and being too small to admit of light, their position and distance are only estimated. The vicinity is strewed with stars from the 10th to the 15th mags., of which the most clustering part is about 8′ or 9′ in extent. It is closely *nf* κ in the throne of Cassiopeia, a beautiful individual of a bright yellow colour and 4th magnitude.

["Worth nothing as a cluster."—*Brodie.*]

27. ξ SCULPTORIS. (*h. 3375.)

R. A.	$0^{h.}$ $28^{m.}$ $22^{s.}$	Pret. + $2^{s}·96$
Decl.	S 35° 34′·9	—— N 19″·90

	Position.		Distance.		Epoch.
HERSCHEL, J.	170°	...	4″ *est.*	...	1834·66
STONE	165·8	...	6·1	...	1877·80

A double star. A 6; B 7½.

28. 113 P. O. CETI. (Σ. 39.) XVII.

	h.	m.	s.		s.
R. A.	0	28	52	Prec. +	3·05
		°	′		″
Decl.	S	5	9·3	—— N	19·90

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	45·5	...	20·0	...	1830·24
SMYTH	44·6	...	19·6	...	1832·87
DEMBOWSKI	45·6	...	19·9	...	1865·80

A neat double star, between the Whale's tail and the *chétil* of Pisces, on a line striking from β Ceti through α Andromedæ, and about one-third of the distance. A 7, cream yellow; B 9, smalt blue. This is a fine object, being nearly mid-way between two stars, one in the *sf* quadrant, and the smallest in the *np*. My measures were taken under favourable circumstances, and may be deemed good. Piazzi tells us that in Flamsteed's asterism, a companion of the 9th magnitude follows this star, by 11·2^{s} of time, which he could not find. There is, however, at about the same distance, and to the N., a star of this character, although rather smaller. Is the follower, then, variable?

[Secchi and Dembowski independently found A itself to be a close double. Pos. 241·8°; Dist. 0·89; 1877·80, according to Burnham.]

29. π ANDROMEDÆ. XVIII.

	h.	m.	s.		s.
R. A.	0	31	0	Prec. +	3·19
		°	′		″
Decl.	N	33	6·8	—— N	19·88

	Position.		Distance.		Epoch.
	°		″		
SMYTH	173·9	...	35·6	...	1832·90
MAIN	172·3	...	34·4	...	1867·64
BURNHAM	172·8	...	35·1	...	1878·70

A fine double star, between the shoulders of the chained Lady. A 4½, fine white; B 9, blue,—and they point to two small stars at a distance in the *sf* quadrant. A line carried from α Pegasi to α Andromedæ, and extended 6° beyond, strikes upon π. Ptolemy was *right* in stating it to be upon the shoulder; but as the figures of the constellations are drawn on many modern celestial maps with the fronts towards the observer, π then appears to be situate on the breast. It is well described by Piazzi: "*duplex comes* 10^{ae} *magnitudinis sequitur* 0·6^{s} *temporis circiter* ½ *min. ad austrum.*" This object was first registered as a double star by H.; but though he pronounced his distance of 34·20″ to be inaccurate, it must have been pretty near the truth, for subsequent measures indicate about the same.

30. δ ANDROMEDÆ. XIX.

	h. m. s.		s.
R. A.	0 33 26	Prec. +	3·18
Decl.	N 30° 15′·5	—— N	19″·85

	Position.	Distance.	Epoch.
	°	″	
Burnham	194·4	229·1	1879·54

A bright star with a telescopic companion to the *sp.* A 3, orange; B [10], dusky; with 3 small stars in the southern part of the field. It is on the right shoulder of Andromeda, though the old Catalogues term it "clarior in sinistrâ scapulâ," as an accepted interpretation of the contested ἐν τῷ μεταφρένῳ of Ptolemy; and it is found by a line from γ passed over β, and carried about 7° beyond the latter.

31. 55 PISCIUM. (Σ. 46.) XXI.

	h. m. s.		s.
R. A.	0 34 8	Prec. +	3·14
Decl.	N 20° 50′·7	—— N	19″·83

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	192·7	6·37	1830·22
Smyth	193·7	5·9	1833·83
Dunér	191·9	6·34	1870·32

A neat double star, ascertained by a line through δ and ε Andromedæ, and 7° beyond the latter. A 6, orange; B 9, deep blue,—the colours in good contrast, and therefore forming a rich specimen of opposed hues. [Dembowski in 1856 made B deep red.] This very beautiful object is between the head and right arm of Andromeda.

32. α CASSIOPEIÆ. XX.

	h. m. s.		s.
R. A.	0 34 16	Prec. +	3·36
Decl.	N 55° 56′·3	—— N	19′·83

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	275·5	56·1	1781·97
Smyth	279·7	61·5	1851·92
Burnham	279 8	62·5	1878·65

A *Nautical Almanac* star, with a companion. A 3, pale rose-tint; B [9½], smalt blue. This object is in the right breast of *Dhát-al-Kursa*, the Lady of the Throne; and it also obtained the names of Lucida Cassiopeia and Schedir; the last being probably a corruption of *Al-sadr*, the breast, by the framers of the Alphonsine Tables. The Arabians having no passion for delineating the human form, made a dog of Cepheus, and its female of Cassiopeia, retaining the *Sedes Regia*, or throne of the latter; but the *Canis fœmina* meant no disrespect.

Cassiopeia, one of the ancient 48 asterisms, formed by 5 bright stars disposed something like an M, is a well-known circumpolar constellation, next to her husband Cepheus, and on the opposite side of the pole to the Great Bear. The earlier Arabians considered the whole as a large hand, of which the bright stars constituted the finger-points, and in which was even included the nebulous group in the left hand of Perseus. Successive ages have yielded these numbers:

Ptolemy . . .	13 stars.	Hevelius	38 stars.
Ulugh Beigh . .	13 „	Flamsteed . . .	55 „
Tycho Brahé . .	46 „	Bode	134 „

There has been much idle discussion as to the orthography of this lady's name, whether it should be written Cassiopea, after the Latins, or Cassiepea [or Cassiopeia] from the Greek Κασσιέπεια; and the result has left either to the writer's choice—*utrum horum*, &c. In the early illustrations to Hyginus she is bound to her throne, or rather to a seat with a sort of gibbet-back, very much like the scaffold called *i tre pezzi di legno* by the Italians. Thus secured she cannot fall out in going round head downwards, pursuant to sentence.

Sir W. Herschel has tabulated the comparative lustre of the stars in this constellated group, and the statement will be found in *Phil. Trans.*, vol. lxxxvi.

Shedir used to be thought variable. H.'s observations in 1796 make α and γ of the 3rd magnitude, and β 3·2 in lustre of the stars in Cassiopeia; and its brightness is marked γ in Ptolemy. Certainly when Sir J. Herschel called my attention thereto, it was smaller than β or γ of the same constellation. "That the fluctuation in splendour of this star," he writes, "should have heretofore escaped notice, is not extraordinary, since the difference between its greatest and least brightness can hardly be estimated at so much as half a magnitude." Its period is stated at about 200 days, but in July, 1839, it was positively brightening and better defined than the other two. [Schmidt declares that the variability of this star is a myth.]

To find this star from the northward, project a ray from ϵ Ursæ Majoris through the Pole-star, and it will pass through the middle of Cassiopeia, at nearly an equal distance on the other side of the pole. The circumvolution is well marked; when Ursa is at its lowest position below the pole, Cassiopeia is near the zenith, and *vice versâ*. If Shedir is required from the southward, resort to the galley rhyme:

From *alpha* Ceti, to the east of Al'mak, towering rise,
You'll mark on Cassiopeia's breast where Shedir decks the skies.

33. 18 ♅. V. ANDROMEDÆ. (h. 44; H. 105; R.) XXII.

	h. m. s.		s.
R.A.	0 34 23	Prec. +	3·23
Decl.	N 41° 5′·1	—— N	19″·83

A large faintish nebula of an oval form, with its major axis extending N. and S. It is between the left arm and robes of Andromeda, a little to the *np* of 31 Messier; and was discovered by Miss Herschel in 1783, with a Newtonian 2-foot sweeper. It lies between two sets of stars, consisting of four each, and each disposed like the figure 7, the preceding group being the smaller; besides other telescopic stars to the S. This was registered by ♅. as 30′ long and 12′ broad, but only half that size by his son; and there was a faint suspicion of a nucleus.

[Engraved, Bond, *Trans. Amer. Acad.*, N.S., vol. iii. p. 86; but Lord Rosse remarks:—"Far too bright and sharply defined in Bond's drawing."]

34. 146 P. O. CETI. XXIII.

	h. m. s.		s.
R.A.	0 35 6	Prec. +	3·05
Decl.	S 4° 57′·3	—— N	19″·82

	Position.		Distance.		Epoch.
BURNHAM	290°·0	...	65″·0	...	1879·89

A wide double star to the N. of the Whale's tail, over which an imaginary line from η Ceti to a Pegasi passes, at near 9° from the former. A 6½, pale topaz; B 9, violet-tint,—several other stars in the distant parts of the field. This object, though coarse, is pleasing, from its contrasted colours: it was seen and thus described by Piazzi: "Aliæ 9ae magnitudinis 3·2″ temporis præcedit, ½ min. ad boream."

35. 31 M. ANDROMEDÆ. (h. 50; H. 116.) XXIV.

1870

+ 11·7 = 2 4[illegible]

	h. m. s.		s.
R.A.	0 36 47	Prec. +	3·24
Decl.	N 40° 40′·1	—— N	19″·80

An overpowering nebula, with a companion about 25′ in the south vertical. It is of an oval shape, light, brightening towards the *sf* edge of the general mass, and of a milky irresolvable nebulosity; but though described "in cingulo Andromedæ," is between the robes and left arm of the Lady, and certainly below the girdle. There are numerous telescopic stars around; and 3 minute ones are involved in the glow, but which can have no connection with it, and are doubtless between our system and the nebulosity. The axis of direction trends *sp* and *nf;* and it may be caught by a good eye, on a very fine night, by running a fancied line from γ Andromedæ to β Andromedæ, and from thence carrying a rectangular glance to a distance of about 6½°. It can also be struck upon by a ray from γ Ceti, over β Arietis, and through β Andromedæ, to 6½° beyond.

This is the oldest known nebula; for though it attracted but little notice till the 17th century, it was seen, at least, as far back as 905 A.D. Simon Marius re-discovered it,—if such a term can be applied to an object seen with the naked eye: in his rare work *De Mundo Joviali* that astronomer acquaints us, that he first examined it with a telescope on the 15th Dec. 1612; he was astonished at the singularity of the phenomenon, but expressly says that he leaves to others to judge whether it was a new discovery or not. It was therefore by an oversight that Halley ascribes the discovery, in 1661, to Bulialdus (*Ismaël Boulliaud*); who himself mentions its being known as *Nebulosa in cingulo Andromedæ,* and that it had been noticed 150 years before by an expert though anonymous astronomer. The tenuity of its boundary offering no definition for exact comparison, has made the several attempts to figure it so conflicting as to mislead. Marius describes it as resembling the diluted light of the flame of a candle seen through horn,—Halley mentions that it emits a radiant beam,—Cassini calls it *à peu-près triangulaire,*—Le Gentil considered it round for some years, then oval, but always of an uniform light in all its parts,—while Messier represents it as resembling two cones, or pyramids of light, opposed by their bases.

FIG. 1. 31 M. ANDROMEDÆ.

From such statements, Boulliaud and Kircher thought this wonderful object appeared and disappeared, like Mira; and Le Gentil had no doubt of its undergoing changes in form. But probably this discordance is a consequence of the means employed. Le Gentil, by his paper of 1749, seems to have used telescopes of various sizes, in order to see it very clearly—"non seulement pour servir à la reconnoître, mais encore pour voir si dans la suite elle ne seroit point sujette à quelque variation, soit dans la figure, soit dans la position;" yet 15 years afterwards Messier differs from him, by assigning a greater brilliance to the centre than to the edges, which latter accords better with my views of it, than do our apparent mean places. It is, however, remarkable that Messier examined this giant nebula with a $4\frac{1}{2}^{ft}$ Newtonian, and then turned the instrument upon γ Andromedæ—"qui en étoit fort près"—to compare its light with that of the star, on a beautiful night of August, 1764; but he makes no mention of the duplicity, or contrasted colours, of that lovely star.

Sir William Herschel gave this a rigid scrutiny, and concluded it to be the nearest of all the great nebulæ. "The brightest part of it," he says, "approaches to the resolveable nebulosity, and begins to show a faint red colour; which, from many observations on the magnitude and colour of nebulæ, I believe to be an indication that its distance in the coloured part does not exceed 2000 times the distance of Sirius." Does not exceed that distance! That is so far from us, that light, which is endowed with the swiftest degree of motion yet known, flying along at the rate of 186,660 miles in a second of time, or about 11 millions of miles in a minute, would require upwards of 6000 years to traverse the awful interval: as to that type of terrestrial velocity, so often cited, the cannon-ball, with its 500-miles-an-hour pace, it would have no chance of passing the same space under nine or ten thousand millions of years. What an overwhelming idea does such an astonishing conclusion give of the All-wise and Omnipotent Intelligence!

The companion was discovered in November, 1749, by Le Gentil, and was described by him as being about an eighth of the size of the principal one; he adds, "*elle m'a paru exactement de la même densité que l'ancienne.*" The light is certainly more feeble than here assigned. Messier—whose No. 32 it is—observed it closely in 1764, and remarked that no change had taken place since the time of its being first recorded. In form it is nearly circular.

["Huggins finds a continuous spectrum, but cut off at the red end. It seems therefore not gaseous: if stellar, it is strange that comprising such extremes of feebleness and condensation, it can be resolved with certainty nowhere, the nucleus only showing a granular texture in great instruments. There is some deep mystery here."—*Webb.*]

[Engraved in *Trans. Amer. Acad.*, N. S., vol. iii. p. 86.—*Bond.*]

36. 78 H̥. VIII. CASSIOPEIÆ. (h. 52; H. 120.) XXV.

		h.	m.	s.			s.
R. A.		0	37	7	Prec.	+	3·45
		°	′				″
Decl.	N	61	11·2		——	N	19·80

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	68·0	...	16·4	...	1879·49

A small double star, in a loose cluster of about 30 of the 9th and 10th magnitudes, occupying all the field; but there being no star-dust, or nebulosity intermixed, the firmament appears unusually dark between them. The most conspicuous object is the double star here recorded, of which A is of the 8½ magnitude, and B of the 11th, both pale. This cluster, which is on the seat of Cassiopeia, and exactly half-way between γ and κ, was discovered by Miss Herschel in 1784; and described by H̥. as "taking up 15 or 20 minutes."

37. β CETI. XXVI.

		h.	m.	s.			s.
R. A.		0	38	4	Prec.	+	2·99
		°	′				″
Decl.	S	18	35·4		——	N	19·78

	Position.		Distance.		Epoch.
	°		″		
SMYTH	221	...	542	...	1836·72

A *Nautical Almanac* star, with a distant companion in the *sp* quadrant. A 2½, yellow; B 12, pale blue [uncertain, *Knott*],—and there is a 9th magnitude star in the *sf*, following by about a minute of time.

This star is in the S. branch of the Whale's tail, whence it obtained the name of *Dheneb Ḳaïtós jenūbí.* But it has been more widely noticed as Diphda,—from *Ḍifda' al tháni*, or the second frog, pertaining to an original Arabian constellation, of which the first frog was *Ḍifda al auwel*, the same with Fom-al-ḥút, or α Piscis Australis. From various comparisons of their lustre, β Ceti is certainly larger than α; they were both registered γ, or 3rd magnitude, by Ptolemy: but it seems to have been increasing in brightness. A fancied line between α Piscis Australis and α Ceti passes over β Ceti, in about mid-distance.

38. 175 P. O. ANDROMEDÆ. (Σ. 1 App. I) XXVII.

R. A.	0h. 40m. 30s.	Prec. + 3s·20
Decl.	N 30° 20″·6	—— N 19″·74

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	237·6	...	45·0	...	1783·02
Herschel, J., and South	236·0	...	46·4	...	1821·95
Smyth	235·8	...	46·4	...	1836·12
Main	233·5	...	46·2	...	1865·79
Bellamy	233·1	...	46·7	...	1875·76

A wide double star, 1½° following δ on the Lady's right shoulder. Both individuals are of the 8th magnitude, and pale yellow. B is Piazzi's No. 176; the pair is not a fine one. The very slight decrease of angle may imply motion.

39. — PHOENICIS. (*h. 3395.)

R. A.	0h. 40m. 31s.	Prec. + 2s·87
Decl.	S 42° 30′·4	—— N 19″·74

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	63·0	...	8·9	...	1836·6

A double star. A 8½; B 9.

"This is a very remarkable star. The colours of both individuals are alike, viz. a very high orange, almost red."—(*Sir J. Herschel.*)

40. 181 P. O. CASSIOPEIÆ. (Σ. 59.) XXVIII.

R. A.	0h. 41m. 45s.	Prec. + 3s·34
Decl.	N 50° 50′·6	—— N 19″·73

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	140·5	...	2·0	...	1782·66
South	147·6	...	2·57	...	1825·14
Struve, W.	144·9	...	2·19	...	1832·33
Smyth	146·8	...	2·4	...	1836·94
Mädler	146·5	...	2·24	...	1851·52
Dunér	148·1	...	2·21	...	1871·94

A close double star, between Andromeda's knee and the head of Cassiopeia, just following a line projected from κ through α, and carried 5° beyond the latter. A 8, flushed white; [B 8½], white. As H̲. saw them "very unequal" in 1782, and "difficult to be seen," the small star may be variable; the redness he imputes, was probably owing to causes already alluded to. H̲. marked his observation as "very exact" in his manuscript; a slow change of position was therefore inferred by his son: and subsequent observations bear this out.

41. 1 ♅. V. CETI. (h. 61, 2345; H. 138.) XXX.

R. A.	h. 0	m. 42	s. 13	Prec. +	s. 2·96
Decl.	S	° 25	′ 53·7	—— N	″ 19·72

A long narrow nebula, preceding the clumsy stern-frame of Cetus, but close to the boundary assigned to Apparatus Sculptoris. It is of a pale milky tint, and trends *sp* and *nf* with its brightest portion towards the S. There are several small stars in the field, of which the nearest preceding is of the 9th magnitude, and reddish. A line drawn from the 8th magnitude star in the *np* quadrant, to the 8th in the *nf*, will be parallel to the axis of the nebula, which—owing probably to the inferiority of my means—I could not make out to be of the extreme length figured by Sir J. Herschel. This singular object was discovered by Miss Herschel, in 1783. A line shot from *α* Andromedæ through *β* Ceti, and carried about 7° to the S., where Fom-al-haut will appear nearly at right angles with it, marks the site of the nebula.

42. *η* CASSIOPEIÆ. (Σ. 60.) XXIX.

R. A.	h. 0	m. 42	s. 26	Prec. +	s. 3·45
Decl.	N	° 57	′ 13·9	—— N	″ 19·71

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	62·1	11·2	1779·63
STRUVE, W.	80·2	10·8	1819·80
SMYTH	87·8	9·8	1830·91
SMYTH	95·8	9·1	1843·19
MÄDLER	112·0	7·6	1855·51
DOBERCK	150·2	5·7	1877·76

A neat binary star, in the cestus [*i.e.* armlet] of the seated Lady, forming the apex of a right-angled triangle with *α* and *β*. A 4, pale white; and B 7½, purple. This superb physical object was discovered to be double by ♅.

[The estimates of colour vary much, and the latest and best authenticated are A, yellow and B, red.]

By ♅.'s re-examination in 1803, a rapid angular velocity was detected.

Sir J. Herschel, in his discussion of 1831, said he would not then decide, on account of the uncertain determination of the distances, whether the motion thus established was orbital or parallactic. But, as he added, that the small star, in all probability, would be on the parallel, or in the act of changing quadrants from *nf* to *sf* in the beginning of the year 1835, I carefully watched, both before and after, and saw the prediction verified. These double-star orbits are really among the most interesting subjects which modern research has to occupy itself about; and their investigation offers a beautiful field for the *amateur* astronomer.

[The elements of this star's orbit are still very uncertain in spite of our having 100 years' observations at command. Doberck's period is 222^y; Grüber's 195^y; and Dunér's 176^y.]

43. 65 PISCIUM. (Σ. 61.) XXXI.

		h.	m.	s.			s.
R. A.		0	43	58	Prec.	+	3·20
			°	′			″
Decl.	N		27	6·7	——	N	19·70

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	300·9	...	4·0 ±	...	1783·15
SMYTH	298·5	...	4·5	...	1838·17
DUNÉR	298·6	...	4·3	...	1872·33

A close double star, which, though classed in Pisces, is placed by the map artists on the right arm of Andromeda; where it may be struck upon about half-way between π and η. A 6, and B 7, both pale yellow. [Knott says both equal, and of mag. 6.] This fine object was discovered by ♅.

He again measured its position in 1802, when the results seemed to warrant the assumption of a slow retrograde orbital motion; but this is not confirmed by the later observations. By assembling the observations in one view, H. arrived at the conclusion that the decrease might be 0·117° per annum; and supposing the star to revolve uniformly in a circle, its period would be 3077 years. My measures, however, drawn through a similar comparison, yield only —0·06° per annum, and infer an *annus magnus* of a much longer period.

[Very little, if at all, unequal in magnitude.—*W. Struve*; *Webb.*]

44. 159 ♅. I. CASSIOPEIÆ. (h. 71; H. 158; ℜ.)

		h.	m.	s.			s.
R. A.		0	45	50	Prec.	+	3·35
			°	′			″
Decl.	N		46	57·9	——	N	19·66

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; R; 2 st 10 nr;" which means:—"Considerably bright; pretty large; round; 2 stars of the 10th magnitude are near." It makes a very obtuse-angled triangle with the stars in question. Its diameter is about 20″, and it is "almost planetary" in character.

45. 20 Ḥ. VI. SCULPTORIS. (h. 74, 2354; H. 162.)

		h.	m.	s.			s.
R.A.		0	47	20	Prec.	+	2·93
			°	′			″
Decl.	S		27	10·9	——	N	19·63

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; L; l E; st 12 ... 16;" which means:—"a globular cluster; bright; large; little extended; the stars are chiefly from the 12th to the 16th magnitudes."

46. 36 ANDROMEDÆ. (Σ. 73.) XXXII.

		h.	m.	s.			s.
R.A.		0	49	4	Prec.	+	3·19
			°	′			″
Decl.	N		23	2·0	——	N	19·60

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	307·1	0·90	1830·78
Struve, W.	307·8	0·84	1832·14
Smyth	322·9	1·0	1843·12
Struve, O.	335·9	1·33	1854·70
Schiaparelli	355·8	1·27	1877·01

A very close double star, a miniature of η Coronæ, in the Lady's right elbow, and closely *np* of η. A 6, bright orange; B 7, yellow. This beautiful golden pair is very difficult, being designated by Σ. *aureæ vicinissimæ.*

But the earliest measures I met with are those of H., from a comparison with which I am led to infer that there is a decided direct orbital motion.

As this was an object which demanded every assistance under high powers—and most of my positions were made with an eye-piece magnifying 600 times—I resorted to the recommendation of Sir J. Herschel, before alluded to, of applying a central paper disc to improve the separating power; and, in this instance, I think it was an advantage.

[Closely *np* η in the direction of ζ. Doberck finds a period of 349y.]

47. γ CASSIOPEIÆ. XXXIII.

		h.	m.	s.			s.
R.A.		0	50	4	Prec.	+	3·57
			°	′			″
Decl.	N		60	7·2	——	N	19·58

	Position.	Distance.	Epoch.
	°	″	
Smyth	347	350	1837·68

A bright star with a distant telescopic companion. A 3, brilliant white; B 13, blue. This fine star is on the right hip of Cassiopeia, and the following part of the field has a scatter of small stars from 10th to 13th magnitudes, so as almost to make a cluster.

To find this star by alignment, project a glance from ε Ursæ majoris, the inner individual of the Greater Bear's tail, through the Pole-star, and at nearly a similar distance beyond, it will meet with γ Cassiopeiæ.

48. μ ANDROMEDÆ. XXXIV.

	h.	m.	s.		s.
R. A.	**0**	**50**	**39**	Prec. +	3·30
		°	′		″
Decl.	**N**	**37**	**54·2**	—— N	19·57

	Position.	Distance.	Epoch.
	°	″	
Smyth	115	45	1833·88
Challis	110·5	49·2	1842·67

A most delicate double star. A 4, bright white; B 16, dusky grey. On the Lady's back, and just below the girdle; and it may be found by carrying a line from γ Pegasi through δ Andromedæ, and extending it 8° or 9° beyond, to the N.W. An object of extreme difficulty.

Following this on the parallel, at about 20^{m}, is a very neat double star, of the 8th and 11th magnitudes, and about 12″ apart: this might have been considered an object of some delicacy, but tried after μ appears quite *staring*, and its colours, pale yellow and green, are very decided.

49. 2367 h. TOUCANI. (H. 183.)

	h.	m.	s.		s.
R. A.	**0**	**52**	**29**	Prec. +	2·08
		°	′		″
Decl.	**S**	**73**	**3·8**	—— N	19·53

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“⊕; v B; S; l E; st B . . . 15;” which means:—“a globular cluster; very bright; small; little extended; its stars are from the 13th to the 15th magnitude.” A close compressed knot of stars with outliers. This is 23 Dunlop.

50. 251 P. O. PISCIUM. (Σ. 80.) XXXV.

	h.	m.	s.		s.
R. A.	**0**	**53**	**45**	Prec. +	3·07
		°	′		″
Decl.	**S**	**0**	**11·4**	—— N	19·51

	Position.	Distance.	Epoch.
	°	″	
South	296·4	18·8	1825·17
Smyth	301·8	18·5	1838·03
Mädler	305·5	18·5	1853·09
Wilson and Seabroke	312·9	20·0	1874·93

A neat double star, bearing both illumination and high magnifying powers. A 8, pale orange; and B 9, clear blue. This, though assigned to Pisces in the Palermo Catalogue, belongs to the Whale, being in the space between the tail of Cetus and the ribbon of Pisces, at about one-third the distance of β Ceti from β Andromedæ, and nearly in the line; being one of the *amorphotæ*, of which an asterism to be called Testudo was proposed. Piazzi records this object double: "Duplex. Comes 9ae magnitudinis præcedit 1″ temporis parumper ad boream."

From South's measures compared with my own, I inferred a sensible direct orbital motion = 0·4° per annum; and this has been since confirmed.

51. 164 B. ANDROMEDÆ. (Σ. 79.)

		h.	m.	s.		s.
R. A.		0	53	49	Prec. +	3·35
			°	′		″
Decl.	N		44	7·5	—— N	19·51

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	192·4	7·6	1832·45
Dunér	193·5	7·6	1872·03

A double star. A 6, very white; B 7½, bluish white.

52. 26 CETI. (Σ. 84.) XXXVI.

		h.	m.	s.		s.
R. A.		0	58	9	Prec. +	3·07
			°	″		″
Decl.	N		0	46·6	—— N	19·41

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	255·4	17·0	1782·75
Herschel, J., and South	255·3	15·7	1821·87
Smyth	252·6	16·4	1833·86
Seabroke	253·0	16·0	1873·93

A neat double star, close to No. 50, in the vacant space between the Whale's back and the ribbon of Pisces; being exactly in mid-distance between γ Pegasi and ζ Ceti. A 6½, pale topaz; B 9½, lilac tint.

There would appear to be no material change; so that the present conclusion is, that the connexion is merely optical. The distance between the stars, therefore, on the assumption of a scale by their respective magnitudes, must be wonderfully vast.

53. 294 Lac. PHOENICIS. (*h. 3415.)

R. A. 0h. 58m. 54s. | Prec. + 2·77s.
Decl. S 41° 14′·5 | —— N 19″·40

	Position.	Distance.	Epoch.
Herschel, J.	157°·5	1″ *est.*	1834·6

A very close double star. A 7; B 8.

54. ψ^1 PISCIUM. (Σ. 88.) XXXVII.

R. A. 0h. 59m. 47s. | Prec. + 3·20s.
Decl. N 20° 53′·0 | —— N 19″·38

	Position.	Distance.	Epoch.
Herschel, W.	170°·0	27″·5	1779·83
Herschel, J., and South	161·0	30·3	1822·38
Smyth	160·4	30·2	1833·97
Secchi	159·8	30·0	1858·04
Talmage	159·7	29·8	1874·91

A fine double star, both 5½ magnitude, and silvery white. On the dorsal fin of the Northern Fish, with a very small star following; and about one-third the distance of a line drawn from α Andromedæ to γ Ceti. An easy object for a moderate telescope, B being ψ^2. H. and S. thought the distance might have increased, while the position had retrograded: but my observations tend to show *fixity*, which has been confirmed by [later observations].

55. 77 PISCIUM. (Σ. 90.) XL.

R. A. 1h. 0m. 8s. | Prec. + 3·09s.
Decl. N 4° 19′·3 | —— N 19″·37

	Position.	Distance.	Epoch.
Herschel, W.	85°·2	29″·6	1782·69
Smyth	82·5	32·1	1835·88
Wilson	83·3	33·3	1873·93

A fine double star, in the centre of the *kheït*, or ribbon, connecting the two Fishes; and it may be found at rather less than a third of the distance from η Ceti towards β Andromedæ. A 7½, white; B 8, pale lilac. These are nearly in the middle of the line of stars running from the Whale's crest, which Vitruvius (lib. ix.) assures us the Greeks named Hermedone; the which, saith the French commentator, meaneth, *les délices de Mercure;* but according to B. Baldus, *De Verborum Vitruvianorum, &c.*, it is merely a knot in the ribbon of Pisces.

56. *μ* CASSIOPEIÆ. XXXIX.

	h.	m.	s.			s.
R. A.	1	0	37	Prec.	+	3·56
		°	′			″
Decl.	N	54	22·8	——	N	19·36

		Position.		Distance.		Epoch.
		°		″		
Smyth	A B	35	...	50	...	1832·71
	A C	157	...	276		

A coarse triple star in the Lady's right elbow, whence, conjointly with *θ*, the Arabians termed it Marfak. A 5½, deep yellow; B 14, pale blue, with a minute comes *sf*; and C 11, bluish. There are several small stars in the field.

This star is in the British Catalogue; but Baily could not find a perfect observation of it by Flamsteed. It has, however, so rapid a course through space, that it should be constantly watched, as its displacement by proper motion is the largest yet detected among stars not closely double, and having no obvious peculiarity. This is a statement of the several values:

		″		″
Piazzi	R. A.	+5·70	Decl.	−1·65
Baily		+5·82		−1·55
Argelander ...		+5·80		−1·55

Just 18′ S. of *μ* is a star which, though of the 6th magnitude, is not in Piazzi. It is followed nearly on the parallel, about 11^s off, by a 9th magnitude, and both are remarkable from being red, of a decided but not deep tint. This object may have had something to do with the mistakes of Flamsteed respecting *μ*, alluded to by Baily.

To find this star by alignment, draw a line from *β* through *α*, and extend it as far again as the distance between those two, and *μ* will be seen just above, with *θ* following it.

[The two red stars mentioned above may be identical with 14 and 15 Birmingham, but those stars are farther from *μ* Cassiopeiæ than Smyth's statement implies. Birmingham's 6·3 mag. is 1° 28′ S. of *μ*. His 10th mag. *precedes* this $1^m\ 43^s$.]

57. *β* PHOENICIS. (*h. 3417.)

	h.	m.	s.			s.
R. A.	1	1	11	Prec.	+	2·70
		°	′			″
Decl.	S	47	18·3	——	N	19·35

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	17·6	...	30 *est.*	...	1834·76

A conspicuous star with a small companion. A 3½; B 11.

58. 64 ♅. VIII. CASSIOPEIÆ. (H. 204.) XLI.

	h.	m.	s.		s.
R. A.	1	1	24	Prec. +	3·70
		°	′		″
Decl.	N	61	0·3	—— N	19·34

A lucid but loose cluster of small stars—principally 9th to 14th magnitudes, preceded by a 6th—on the robe below the right hip of Cassiopeia; and it will be caught up, at about one-fourth of the distance, on a line from γ towards ε.

["Not worth looking at."—*Brodie.*]

59. η CETI. XLII.

	h.	m.	s.		s.
R. A.	1	3	3	Prec. +	3·00
		°	′		″
Decl.	S	10	45·9	—— N	19·30

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	304·5	...	225	...	1879·89

A bright star with a companion, in a barren field. A 3½, yellow; B 10, [lead coloured],—only two other distant stars in view, one of which is in the *sf*, and the other in the *nf* quadrant. It is on the monster's flank, towards the tail, as implied by *Dheneb-al-Jenúbí;* where it has been mistaken for the Rana Secunda of the Arabs; but which is β Ceti. As this star is useful in the neighbouring alignments, it may be identified by being exactly at right angles with a line shot from α Piscis Australis and carried 8° beyond β Ceti: and it is on the same vertical with β Andromedæ. A is only marked as of ε magnitude in Ptolemy; while Tycho Brahé and Flamsteed make it 3. Had I not adopted Piazzi's magnitudes for my initial star, I should certainly have put this in the 4th degree. Can it be variable?

60. β ANDROMEDÆ. XLIII.

	h.	m.	s.		s.
R. A.	1	3	34	Prec. +	3·32
		°	′		″
Decl.	N	35	2·3	—— N	19·28

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	294·0	...	304	...	1879·55

A bright star with a distant companion. A 2, fine yellow; B [10], pale blue,—and there are [according to Burnham, 6 small stars in the field, within 300″ of A]. The delineations of the Northern Fish and the body of Andromeda here create much confusion; as the Arabs named β Andromedæ, *Jenb-al-muselselah,* or the chained woman's side, and also *Batn-al-hút,* or the fish's belly. This star, once in the Fish's head, is now placed on the Lady's right hip, over the Northern Fish's mouth, whence it was called Mirach, from the mantle or apron round her; but it became the *Miræ* of the Alphonsine Tables, which term was replaced—on Scaliger's suggestion—by *Mízár*, girdle; an amendment, however, that confounded it with ζ Ursæ Majoris. There has been some difference of opinion as to its comparative brilliance. It is certainly rather dim for the above rating, and Ptolemy enrolled it as γ only in lustre; but Ulugh Beigh and all the moderns have ranked it of the 2nd magnitude.

This star was of importance, as forming the 28th and last Lunar Mansion, called *Al Rishà*, the cord, because the vertical bight of the Fish's *kheït* formed its boundary. The famous *Manázil-al-Kamar*, *i. e.* Lunar Mansions, constituted a supposed broad circle, in Oriental astronomy, divided into 28 unequal parts, corresponding with the moon's course, and therefore called the abodes of the moon. This was not a bad arrangement for a certain class of gazers, since the luminary was observed to be in or near one or other of these parts, or constellations, every night. Though tampered with by astrologers, these Lunar Mansions were probably the earliest step in ancient astronomy.

An imaginary line drawn from α Ceti, through the two stars in the head of Aries, will strike upon Mirach; or it will be at a right angle N. of the line carried from β Pegasi to α Andromedæ, and extended as far again westward: or in the directions of the poet:

From Markab run a line beneath th' imprison'd Lady's head,
And over *delta* on her back to Mirach 'twill be led.

61.

ζ PHOENICIS.

	h.	m.	s.			s.
R. A.	1	3	46	Prec.	+	2·54
		°	′			″
Decl.	S	56	49·7	——	N	19·28

	Position.	Distance.	Epoch.
Herschel, J.	244·0°	6·2″	1835·80

A double star. A 5½; B 10. Burnham says that this is not double.

62. φ PISCIUM. (Σ. 99.) XLVI.

	h.	m.	s.		s.
R. A.	1	7	46	Prec. +	3·24
Decl.	N 24°	0′·0		—— N	19″·18

	Position.		Distance.		Epoch.
	°		″		
SMYTH	226·5	...	9	...	1834·79
WILSON	226·0	...	7·6	...	1873·89

A pretty close double star. A 6, orange; and B 13, flushed [=reddish]. This beautiful object is on the ventral fin of the Northern Fish, at a little more than half the distance from γ Pegasi towards α Trianguli; and though marked "objectum subtile" by Σ., it is steadily seen through my telescope. But it is singular that Piazzi says of it, "Duplex. Comes in eodem verticali, admodum exigua et ad austrum." He certainly could hardly have seen it double with his instrument, as it now is; but the acolyte may be variable.

63. ζ PISCIUM. (Σ. 100.) XLVII.

	h.	m.	s.		s.
R. A.	1	7	59	Prec. +	3·11
Decl.	N 6°	43′·7		—— N	19″·18

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	67·4	...	22·1	...	1781·88
SMYTH	63·8	...	23·4	...	1839·05
STRUVE, O.	64·0	...	23·6	...	1851·89
WILSON and SEABROKE	63·7	...	24·7	...	1873·89

A neat double star. A 6, silver white; B 8, pale grey. This fine and easy object is on a bend of the band which joins the two Fishes. The large star may be variable. Ptolemy calls it δ in lustre, and he is followed by Ulugh Beigh, Tycho Brahé, and Hevelius. Baily says, "This star is stated, in the British Catalogue, to be of the 4th magnitude; but in the original observations it is nowhere stated to be more than the 5th; and in one place it is marked as the 6th, but afterwards altered to the 5th, which I have retained." ζ Piscium slightly precedes an occult line drawn between β Ceti and α Trianguli, and is nearly in the mid-distance.

["Probably a very slow orbital motion manifests itself."—*Gledhill.* "Query A var. up to mag. 4."—*Webb.*]

64. 37 CETI. (Σ. 3 App. I.) XLVIII.

	h.	m.	s.		s.
R. A.	1	8	51	Prec. +	3·01
		°	′		″
Decl.	S	8	30·7	—— N	19·16

	Position.	Distance.	Epoch.
	°	″	
SMYTH	A B 332·3 ...	50·6	... 1838·87
	C D 341·1 ...	20·5	
MAIN	A B 332·1 ...	48·3 ...	1865·80

A wide quadruple star. A 6, white; B 7½, light blue; C 8, yellow; and D 10, violet. This fine, though coarse, object is on the monster's tail joint, over η to the *nf*, and preceding θ by a little more than 2°. It appears that the position has remained unaltered.

A line drawn through A B points to a fine double star rather low down in the *np* quadrant, and there are several other stars in the field; a pretty bright one following at a Δ R.A.=26ˢ. The second set, observed by me, or C D, form a miniature of the first pair, and are 77 H. IV. They precede A by about 32ˢ, and are 15′ to the N. of it; they were thus, when first registered by H.:

Position.	Distance.	Epoch.
°	″	
333·4 ...	19·10 ...	1782·73

From observations by South in 1825 we may conclude that no sensible change occurred in the distance of C D in 52 years, but that there might have been a slow direct motion in the angle. [A possibly variable.]

65. κ TOUCANI. (*h. 3423.)

	h.	m.	s.		s.
R. A.	1	12	1	Prec. +	1·98
		°	′		″
Decl.	S	69	27·7	—— N	19·07

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	16·4 ...	4·7 ...	1836·78
SANTIAGO OBS.	17·5 ...	4·4 ...	1850·88
SANTIAGO OBS.	17·0 ...	6·4 ...	1851·89

A double star. A 6; B 10. The Santiago distance for 1851 is probably a misprint.

66. 42 H. VII. CASSIOPEIÆ. (h. 97; H. 256.) XLIX.

	h.	m.	s.		s.
R. A.	1	12	16	Prec. +	3·72
		°	′		″
Decl.	N	~~58~~ 57	~~12·7~~ 44·7	—— N	19·06

	Position.	Distance.	Epoch.
	°	″	
BURNHAM	324·5 ...	13·8 ...	1879·54

A minute double star, in a cluster between the Lady's right knee and her elbow. [A and B, both 8½.] A brilliant aigrette-shaped group of large and small stars. In the centre is the fine double star before us. There is a star of the 7th magnitude at the *sf* verge of the field, which is very bright and white. The cluster is close to φ.

["Insignificant as a cluster."—*Brodie.*]

67. 108 ♅. I. PISCIUM. (H. 264; R.)

		h.	m.	s.			s.
R. A.		1	13	34	Prec.	+	3·09
Decl.	N		2°	38′·6	——	N	19″·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; v L; i R; p B * f;" which means:—"considerably bright; very large; irregularly round; a pretty bright star follows." Dreyer has a note on this object which is not easily intelligible. He says that H. 264 = 250 ♅. III., not 108 ♅. I., and that the R. A. should be increased 30s, and the Decl. 11′; at least his note implies this.

68. 35 CASSIOPEIÆ. L.

		h.	m.	s.			s.
R. A.		1	13	43	Prec.	+	3·91
Decl.	N		64°	4′·9	——	N	19″·03

	Position.	Distance.	Epoch.
	°	″	
South	352·9	50·3	1824·84
Smyth	352·5	49·7	1830·89

A wide double star, on the lower part of the Lady's drapery, and the following of 4 stars describing a lozenge. It may be fished up by carrying a line from δ towards the Pole-star, and intersecting it at rather less than 5°. A 7, white; B 9, flushed,—and there are two other brightish stars in the field.

69. 42 CETI. (Σ. 113.) LI.

		h.	m.	s.			s.
R. A.		1	14	11	Prec.	+	3·06
Decl.	S		1°	5′·2	——	N	19″·01

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	333·6	1·24	1831·61
Smyth	332·8	1·2	1834·84
Mädler	340·0	1·36	1842·75
Secchi	339·7	1·16	1856·48
Seabroke	346·2	1·3	1872·07
Plummer	349·3	1·38	1877·37

A close double star, in the space between the Whale's back and the *kheït*, or band of Pisces, about 10° N. of η Ceti, on the line towards α Trianguli. A 6, bright white; B 8, white. A beautiful object, but very difficult to measure in distance. It seems to have a direct angular movement. [But "great discrepancies are found in the recorded observations."—*Gledhill.*]

70. ψ CASSIOPEIÆ. (Σ. 117.) LII.

	h. m. s.		s.
R. A.	1 18 10	Prec. +	4·15
	° ′		″
Decl. N	67 33·3	—— N	18·90

		Position.	Distance.	Epoch.
		°	″	
Herschel, W.	A B	102·2	33·4	1782·66
Struve, W.	A B	101·7	32·2	1831·04
	B C	253·3	3·01	
Smyth	A B	102·1	31·9	1836·28
	B C	252·6	2·0	
Secchi	A B	104·9	29·6	1858·82
	B C	256·4	2·25	
Flammarion	A B	105·7	29·5	1877·12
	B C	256·1	2·9	1877·34

A fine triple star, close to the lower part of the Lady's throne, and in a line between Polaris and δ Cassiopeiæ, at rather less than a third of the distance from the latter. A 4½, orange tint; B 9, blue; C 11, reddish. This object was first seen triple by Σ.

A B are only optically double, having experienced no change in position or distance. Whether B and C are bodies physically connected, remains for future observers to determine. They form a delicate test.

["B C probably binary. The magnitude of A is variously given." —*Gledhill.*]

71. α URSÆ MINORIS. (Σ. 93.) XLIV.

	h. m. s.		s.
R. A.	1 18 14	Prec. +	22·02
	° ′		″
Decl. N	88 43·3	—— N	18·96

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	202·9	18·4	1781·50
Smyth	210·1	18·6	1838·16
Secchi	212·4	18·4	1859·95
Dunér	212·4	18·5	1870·90

A *Nautical Almanac* star, at the tip of the Little Bear's tail, with a companion in the *sp* quadrant. A $2\frac{1}{2}$, topaz yellow; B $9\frac{1}{2}$, pale white. A is "Polaris," and from its perpetual apparition in this hemisphere, the most practically useful star in the heavens, whether to the astronomer or the seaman; and the want of such a constant reference at the opposite pole is severely felt. Piazzi devoted much labour to obtain all the conditions of this remarkable star, and prudently concluded that, in consequence of the great and inconstant precession in the immediate vicinity of the pole, it is difficult to separate the proper motions in space from that element: it was also narrowly watched for the detection of parallax, from 1802 to 1804, at each season, in January, July, April, and October, and it was deemed that an absolute quantity of 1·31″ was fairly deduced. It was first classed double by Ħ.

[An increase of angle seems probable, but the observations are far from consistent.]

A is marked 2·3 magnitude from the rule I have adopted, otherwise it is not even a very bright 3rd size. It was ranked γ by Ptolemy, and Copernicus adopted it; but Tycho elevated it to the 2nd magnitude; and Kepler, who in the Rudolphine Tables speaks of it as *vulgo Polaris*, rates it the same. At present it is only $1\frac{1}{4}$° from the polar point, and by its northerly precession in declination will gradually approach to within 26′ 30″ of it. This proximity to the actual pole will occur in A.D. 2095, but will not recur for 12,860 years. The period of the revolution of the celestial equinoctial pole about the pole of the ecliptic is nearly 26,000 years; the N. celestial pole therefore will be, about 13,000 years hence, nearly 49° from the present polar star.

The alignment rule for finding this star is so well known that it scarcely demands repeating: yet it may be as well to remind the reader, that an imaginary line through the two well-known pointers, *α* and *β Ursæ Majoris*, nearly passes over it; and once found, it will not readily be mistaken, or forgotten, since, to the naked eye, it appears always in the same place.

In the alignment of the heavens, it may assist rough estimations to assume the distance between the Pointers at 5°, and that between the Pointers and Polaris at about 30°, which, though not the true distances, will serve as a gazing scale. The diagram shows the direction, not the

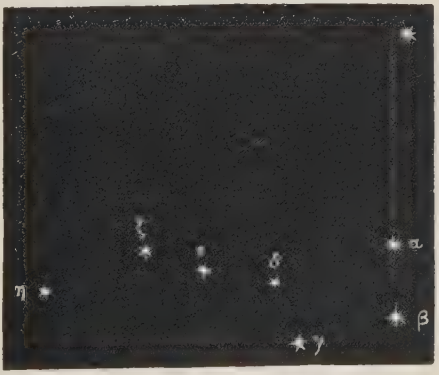

FIG. 2. URSA MAJOR AND POLARIS.

distance, of the Pole-star. From Polaris, lines of direction may be led to most of the great stars around. Hence the poetaster :

The ever watchful Kokab *guards*, while Dubhe points the Pole;
The Pole at rest, sees Heaven's bright host unwearied round him roll.

The use of the Pole-star in navigation is recorded to have been introduced by Thales ; but as it was very anciently called Phœnice, and that philosopher also resided in Phœnicia, it was probably derived from the mariners of that nation, and has ever since been the "lode-star" of seamen. Aratus mentions it as a sure sea-guide, or beacon ; saying, —*in voce Germanici*—

Certior est Cynosura tamen sulcantibus æquor.

Dryden has happily described the infancy of navigation :—

Rude as their ships were navigated then,
No useful compass, or meridian known;
Coasting they kept the land within their ken,
And knew no north but when the Pole-star shone.

Among our own seamen, the *Stella Maris*, or Pole-Star, and its companions, have immemorially been under requisition. Recorde tells us, in the *Castle of Knowledge*, 300 years ago, that navigators used two pointers in Ursa,—"which many do call the Shafte, and other do name the Guardas, after the Spanish tonge." Richard Eden, in 1584, published his *Arte of Navigation*, and therein gave rules for the "starres," among which are special directions for the two called the Guards, in the mouth of the "horne," as the figure was called. See β Ursæ Minoris. In the *Safeguard of Saylers*, 1619, are detailed rules for finding the hour of the night, by the "guardes :" and the Bears generally were regarded as rustic time-pieces, whence Shakspeare, in the Gadshill affair, makes the carrier exclaim, "An't be not four by the day, I'll be hanged : Charles's wain is over the new chimney, and yet our horse not packed !" As to the Little Bear, the whole animal is swung round by the tail every twenty-four hours : whence the general name for the pole was *Koṭb*, which means the spindle or pin fixed in the under-stone of a mill, around which the stars typifying the upper stone turn.

I more than once attempted to fix the place of a little star, called *Blucher* by some of the savants, which precession will have now brought within 2′ of the pole. But being only of the 10th magnitude it is a difficult object to touch in R.A., and there is a wide companion still smaller. A nebula, like a dull star, is perceivable near it, and is H. 2043, *Polarissima ;* so called from its proximity to the pole. [R. A. (1860), $10^{h.}\ 8^{m.}\ 8^{s.}$; Decl. + 89 53·2. The precision in R. A. for 1880 is $87^{s.}$ per annum, a quantity so large that I hesitate to attempt to bring up the place to 1890, especially as the R. A. altered more than 7 *hours* between 1830 and 1860.

Arctos Minor, or the Lesser Bear, is not mentioned by Hesiod or Homer, therefore was probably not yet admitted among the constellations in that shape: indeed, *Cynosura* was more likely to have been represented by a dog. Jacob Bryant, dreaming of Philistines, considers the word as having been borrowed by the Greeks from *Cahen Ourah.* Thales is reported to have formed it, from perceiving the seven principal stars make a similar figure to the well-known wain of the Great Bear; but reversed with respect to each other: whence Aratus assures us that both the Bears—the *magna minorque feræ* of Ovid—were called *ἅμαξα*, or waggons, by the Greeks. But instead of the obtuse-angled projection of the Great Bear's stern, the Lesser Bear's tail curves gradually till it reaches the Pole-star. It is, however, a perplexing asterism, from the number of hours of R.A. it extends over, and its components have been thus registered:

Ptolemy . . .	8 stars.	Hevelius	12 stars.
Tycho Brahé . .	20 "	Flamsteed . . .	24 "
Kepler	21 "	Bode	75 "

It appears that Ursa Minor was a favourite constellation among the Arabians, who called the Pole-star Jedi, or the Kid; and *Al Kaukab-al-shemálí*, the Northern star, an appellation originally given to β, which in Ptolemy's time was nearer to the pole than α. On the Cufico-Arabic globe described by Assemani the asterism is written *Al Dubb-al-ashgar:* and in the Alphonsine Tables it is corruptly termed *Alrucaba*, which term has been discussed by Grotius, Hyde, and Ideler, as grounded in Hebrew, Chaldaic, or Arabic. We are told that the pole was also termed *Al Ḳiblah,* because of the obligation in Mahometan prayer to know which way the head is. To find the kiblah in an unknown place they looked to Polaris, and could thereby readily *orientize* themselves. To this necessity we are considered to be indebted for the astronomy of the Abbaside Caliphs.

[Dawes proposed this object as a general test for small achromatics. An aperture of 2^{in} with a power of 80 should always show B, if the eye and the telescope are good.]

72. **151 H. I. PISCIUM.** (h. 117; H. 307; R.)

	h.	m.	s.			s.
R. A.	**1**	**19**	**1**	Prec.	+	3·14
Decl.	**N**	**8°**	**57′·6**	——	N	18″·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; m b M; 4 S st nr;" which means:—"very bright; pretty large; much brighter in the middle; 4 small stars are near."

73. 404 Lac. SCULPTORIS. (*h. 3436.)

		h.	m.	s.		s.
R. A.		1	22	0	Prec. +	2·80
Decl.	S	30°	47′·7		—— N	18″·79

	Position.		Distance.		Epoch.
Herschel, J.	121°	...	10″	...	1834·74

A double star. A 7½, yellow; B 9, blue.

74. 48 H̶. VII. CASSIOPEIÆ. (h. 124; H. 330.) LIII.

		h.	m.	s.		s.
R. A.		1	22	9	Prec. +	3·97
Decl.	N	61°	43′.2		—— N	18″·78

An open cluster, on the Lady's leg, and nearly in mid-distance from ε towards γ. It is a gathering of large and small stars, with glimpses of star-dust of considerable extent, and irregular figure; but a few of the principal individuals assume a form not unlike that of an hour-glass. There is no particular compression or condensation of the stars to suggest the existence of a central force; yet the group is sufficiently separated to indicate its forming a peculiar system of its own.

[Designated by Smyth "124 H" (*i.e.* of the 1833 *Catalogue*), but I have preferred to prefix the earlier designation.]

["Too open to be deemed a cluster at all."—*Brodie.*]

75. 85 P. I. PISCIUM. LIV.

		h.	m.	s.		s.
R. A.		1	22	36	Prec. +	3·13
Decl.	N	7°	23′·5		—— N	18″·77

	Position.		Distance.		Epoch.
South	98°·3	...	69″·7	...	1825·00
Smyth	98·7	...	68·3	...	1836·99

A star with a distant companion, in the space between the Fishes, in front of the Ram; and nearly half-way from η Ceti towards α Trianguli. A 7, yellow; B 8½, pale blue. It is a coarse object, in a poor field.

76. 100 H̶. I. CETI. (h. 128; H. 342; R̶.) LVI.

		h.	m.	s.		s.
R. A.		1	25	50	Prec. +	3·00
Decl.	S	7°	26′·3		—— N	18″·67

A tolerably bright round nebula, of a pearly tint, just above the

Whale's back; discovered by Sir W. Herschel. The field is very interesting, for nearly S. of the little nebula is a neat double star, the components of which are of the 9th and 11th magnitudes, the latter in the *sf* quadrant; and there are three other telescopic stars on the Northern verge. A line from the pair above to the minute star below would fall just before the nebula.

77. 131 Σ. CASSIOPEIÆ.

	h. m. s.		s.
R. A.	1 25 55	Prec. +	3·88
Decl.	N 60° 7′·7	—— N	18″·66

	Position.		Distance.		Epoch.
Struve, W	142°·3	...	13″·6	...	1830·27

A double star. A 6¼, yellowish; B 10.

78. 103 M. CASSIOPEIÆ. (h. 126; H. 341.) LV.

	h. m. s.		s.
R. A.	1 25 56	Prec. +	3·91
Decl.	N 60° 7′·1	—— N	18″·66

	Position.		Distance.		Epoch.
Struve, W.	142°·3	...	13″·6	...	1830·27
Smyth	140·9	...	14·4	...	1832·66

A neat double star (=Σ. 131) in a cluster, on Cassiopeia's knee. A 7, straw coloured; B 9, dusky blue. This is a fan-shaped group, diverging from a sharp star in the *nf* quadrant. The cluster is brilliant from the splash of a score of its largest members, the four principal ones of which are from the 7th to the 9th magnitude; and under the largest, in the *sf*, is a red star of the 8th magnitude.

1° *f*, and a little N. of δ, on the Lady's knee.

79. 2421 h. HYDRI. (H. 356.)

	h. m. s.		s.
R. A.	1 27 4	Prec. +	1·32
Decl.	S 74° 6′·3	—— N	18″·62

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; R; p s b M *; r;" which means:—"bright; small; round; pretty suddenly brighter in the middle, where there is a star; resolveable."

80. 33 M. TRIANGULI. (H. 352; 𝕽.) LVII.

	h.	m.	s.		s.
R. A.	1	27	38	Prec. +	3·35
	°	′			″
Decl. N	30	6·8		—— N	18·61

A large and distinct, but faint pale white nebula, in the precincts of Triangulum, between it and the head of the Northern Fish; with a bright star a little *np*, and 5 others following at a distance, between which and the object, there is an indistinct gleam of *mere nebulous matter.* It was discovered by Messier in 1764; and to ♅. had a mottled aspect under his 7ft reflector, in 1783: but afterwards applying a larger telescope, he resolved it into stars—"the smallest points imaginable." By a method of turning the space-penetrating power of his instrument into a gradually increasing series of gauging powers, he considered the profundity of this cluster must be of the 344th order: *i.e.* 344 times the distance of Sirius from the earth. About 4° from *α* Trianguli, and just N. of a line run from that star to δ Andromedæ.

[One of Lord Rosse's "spirals." Sir J. Herschel noted the great size of this object: nearly ½° in diameter from N. to S. "Only fit for low powers, being actually imperceptible, from want of contrast, with my 144."—*Webb.*]

[Engraved in *Phil. Trans.*, 1850, Pl. xxxvi. Fig. 5; *Phil. Trans.*, 1861, Pl. xxvi. Fig. 10.]

81. 100 PISCIUM. (Σ. 136.) LIX.

	h.	m.	s.		s.
R. A.	1	29	1	Prec. +	3·17
	°	′			″
Decl. N	11	59·8		—— N	18·56

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	85·0	...	15·8	...	1783·59
HERSCHEL, J., and SOUTH	80·4	...	16·0	...	1821·91
SMYTH	78·9	...	15·9	...	1833·86
TALMAGE	78·0	...	16·3	...	1865·78
WILSON and SEABROKE	79·2	...	16·4	...	1873·89

A neat double star. A 7, white; B 8, pale grey. This fine object is on the ribbon under the tail of the Northern Fish; a line from *α* Arietis through *γ*, the first and third of the Ram's head, hits upon 100 Piscium, at about 8° S.W. of *γ*.

The above measures perhaps show a slow *np sf*, or retrograde, orbital change.

[Closely *np* *π*.]

82. 281 H. I. SCULPTORIS. (h. 2423; H. 361.)

		h.	m.	s.		s.
R. A.		1	29	10	Prec. +	2·78
			°	′		″
Decl.	S		29	58·3	—— N	18·56

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; v m E, 118·3°; s b M; * 34·5°; $6{\cdot}5^s$;" which means:—"very bright; very large; very much elongated in the direction of 118·3° with the meridian; suddenly brighter in the middle; has a star in the *nf* quadrant at an angle of 34·5° and at a distance of $6{\cdot}5^s$ of time."

83. 40 CASSIOPEIÆ. LVIII.

		h.	m.	s.		s.
R. A.		1	29	43	Prec. +	4·68
			°	′		″
Decl.	N		72	28·8	—— N	18·54

	Position.		Distance.		Epoch.
	°		″		
SMYTH	240·5	...	42	...	1834·95
BURNHAM	237·2	...	53·5	...	1877·49

A double star between the feet of Cassiopeia and Cepheus, where a line from δ carried a little E. of ψ, and about 5° further, will strike it. A 6, yellow; and B [11], pale blue. This is a delicate though wide object; and is one of the principal members of *Custos Messium*, an asterism placed by Lalande between Rangifer and Cassiopeia, in poorish punning compliment to his friend Messier, the "comet-ferret." It is in a poor field, but about 10′ or 11′ to the *sp* is Σ.'s curious nebula No. 2 [=H. 373]; and nearly following it, about 4^s, is a pair of minute stars lying across the parallel, about 10″ apart.

84. 2426 h. PHOENICIS. (H. 369.)

		h.	m.	s.		s.
R. A.		1	30	15	Prec. +	2·61
			°	′		″
Decl.	S		42	0·1	—— N	18·52

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; m E; g p m b M;" which means:—"bright; pretty large; much extended; gradually pretty much brighter in the middle."

This is 479 Dunlop.

85. 123 P. I. PISCIUM. (Σ. 138.) LX.

	h.	m.	s.			s.
R. A.	1	30	17	Prec.	+	3·13
		°	′			″
Decl.	N	7	5·0	——	N	18·53

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	20·0	...	1·46	...	1830·23
Smyth	26·9	...	1·4	...	1843·10
Secchi	29·1	...	1·46	...	1857·89
Doberck	30·8	...	1·34	...	1877·91

An interesting close double star, in the space between the two Fishes and the meander of the ribbon, nearly half-way on a line from β Arietis towards η Ceti. A 6½, yellowish; B 8, pale white,—a third star following at some distance; probably Piazzi's "sequitur alia 6^{ae} magnitudinis 8′ circiter ad Boream."

[No doubt a binary. There is evidently a progressive increase in the angle.]

86. 74 M. PISCIUM. (𝔥. 142; H. 372; 𝕽.)

	h.	m.	s.			s.
R. A.	1	30	47	Prec.	+	3·21
		°	′			″
Decl.	N	15	13·5	——	N	18·50

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; F; v L; R; v g, p s m b M; r r;" which means:—"a globular cluster; faint; very large; round; very gradually, then pretty suddenly much brighter in the middle; partially resolved—some stars visible."

A spiral nebula. Engraved, Rosse, woodcut, *Phil. Trans.*, 1861.

87. 76 M. PERSEI. (H. 385; 𝕽.) LXII.

	h.	m.	s.			s.
R. A.	1	35	2	Prec.	+	3·33
		°	′			″
Decl.	N	51	1·8	——	N	18·35

	Position.		Distance.		Epoch.
	°		″		
Burnham	228·7	...	33·7	...	1879·54

An oval pearly white nebula, nearly half-way between γ Andromedæ and δ Cassiopeiæ; close to the toe of Andromeda, though figured in the precincts of Perseus. It trends N. and S., with two stars preceding by 11^s and 50^s, and two following nearly on the parallel, by 19^s and 36^s; and just *np* of it is the double star above registered, of which A is 9, white; and B [10], dusky. When first discovered, Méchain considered it as a mass of nebulosity; but Messier thought it was a compressed cluster;

and ♅. that it was an irresolvable double nebula. It has an intensely rich vicinity.

["Curious miniature of M. 27 and like it, gaseous, *p* a little the brighter."—(*Webb.*) 27 M, it will be remembered, is the "Dumb-bell nebula."]

88. 145 P. I. PISCIUM. (Σ. 145.) LXI.

	h.	m.	s.		s.
R. A.	1	35	8	Prec. +	3·31
		°	′		″
Decl.	N	25	11·4	—— N	18·35

	Position.	Distance.	Epoch.
	°	″	
SMYTH	29·2	12	1836·87

A neat double star in a barren field over the horn of Aries, which is readily found by carrying a line from β Arietis, the middle star in the Ram's head, to β Andromedæ, at somewhat less than one-third of the distance: a thwart line from β through α Trianguli passes just to the S. of it, 5½° from α. A 6½, cream yellow; B 13, blue,—and there is a small blue star near the vertical of the *np* quadrant.

89. 6 ERIDANI.

	h.	m.	s.		s.
R. A.	1	35	37	Prec. +	2·25
		°	′		″
Decl.	S	56	45·2	—— N	18·34

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	122·3	3·6	1835·00

A double star. A 6½; B 6½. "A superb double star."—(*Sir J. Herschel.*)

90. 251 CETI. (Σ. 147.)

	h.	m.	s.		s.
R. A.	1	36	18	Prec. +	2·96
		°	′		″
Decl.	S	11	51·6	—— N	18·31

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	86·0	3·5	1822·30
DAWES	87·5	3·9	1836·97
SECCHI	88·5	3·6	1855·89
DEMBOWSKI	88·2	4·0	1877·81

A double star. A 5½, white; B 7½, yellowish white. The changes indicated by the observations are so slight that it seems hardly safe to infer an increase both in angle and distance. This star is designated χ′ by Struve and in Sir J. Herschel's general catalogue, but improperly so, it would appear.

91. 46 ♅. VII. CASSIOPEIÆ. (h. 145; H. 387; ℜ.) LXIII.

	h.	m.	s.			s.
R. A.	1	36	28	Prec.	+	4·06
		°	′			″
Decl.	N	61	20·2	——	N	18·30

A cluster of stars from the 10th to the 14th magnitudes, just below the Lady's right knee; and nearly in mid-distance between δ and ϵ. It is somewhat of a triangular shape, and about 2′ or 3′ in diameter; the hypothenuse is well defined by the three brightest stars in the field, of which the central one is orange-coloured, and of the 8½ magnitude, perhaps Sir W. Herschel's "ruddy:" from analogy it is between us and the components of the cluster.

92. 146 h. CASSIOP. (Neb. = h. 146; H. 388; Star = OΣ. 35.) LXIV.

	h.	m.	s.			s.
R. A.	1	36	36	Prec.	+	3·85
		°	′			″
Decl.	N	55	19·4	——	N	18·30

	Position.	Distance.	Epoch.
	°	″	
Smyth	120	10	1835·74
Struve, O.	114·2	9·9	1850·13
Dembowski	108·6	10·2	1869·32

A double star. A 8, pale white; B 12, dusky. In a loose cluster, between the weapon of Perseus and the elbow of Cassiopeia, one-third the distance from *α* of the latter to *α* of the former constellation: and it may be fished up by carrying a line from κ Cassiopeiæ through *γ* to double the distance beyond. It consists of a gathering of small stars, of 10th to 13th magnitude, divided into two distinct groups; one *sf* of A, and the other *nf*. It is a neat but difficult double star, whose angle of position and distance were estimated.

93. 155 Σ. PISCIUM.

	h.	m.	s.			s.
R. A.	1	38	25	Prec.	+	3·15
		°	′			″
Decl.	N	8	56·3	——	N	18·23

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	332·8	...	4·6	...	1830·60
Dawes	329·9	...	4·6	...	1842·91
Dawes	328·8	...	4·5	...	1853·98

A double star. A 8, white; B 8½, white.

94. 31 H̥. VI. CASSIOP. (Neb. = H. 392; Star = Σ. 151.)

LXVI.

	h.	m.	s.			s.
R. A.	1	38	39	Prec.	+	4·05
		°	′			″
Decl.	N	60	41·3	——	N	18·23

	Position.		Distance.		Epoch.
	°		″		
Smyth	70·2	...	8	...	1833·70

A neat double star, in a cluster near the Lady's right knee; it may be found by drawing a line from *a* through δ, and carrying it about 2½° further. A 9, and B 10½, both bluish. This object is in an elegant field of large and small stars, from a certain degree of brilliance down to infinitesimal points; but without any disposition to form, except that the larger members incline towards a parallelogram in which there are several coarse pairs. In the *sp* quadrant of this cluster is a fine ruby star of the 8th magnitude.

[Webb appears to have failed to see this ruby star. It is not mentioned by Birmingham.]

95. ε SCULPTORIS. (*h. 3461.)

	h.	m.	s.			s.
R. A.	1	40	29	Prec.	+	2·80
		°	′			″
Decl.	S	25	36·2	——	N	18·16

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	69·6	...	5·5	...	1836·62

A double star. A 6, white; B 10, dull red.

96.

163 Σ. CASSIOPEIÆ.

		h.	m.	s.			s.
R. A.		1	43	17	Prec.	+	4·22
Decl.	N	64°	18′·1		——	N	18″·06

	Position.		Distance.		Epoch.
Struve, W.	33°·6	...	34″·9	...	1831·75

A double star. A 6½, golden red; B 9, blue. Webb says that the colours are "exceedingly remarkable."

97.

179 P. I. ARIETIS. (Σ. 174.) LXVII.

		h.	m.	s.			s.
R. A.		1	44	4	Prec.	+	3·30
Decl.	N	21°	43′·9		——	N	18″·03

	Position.		Distance.		Epoch.
Herschel, W.	167°·4	...	3″·0 ±	...	1782·98
South	172·4	...	3·3	...	1823·98
Smyth	169·9	...	2·4	...	1836·11
Dunér	167·5	...	2·8	...	1871·11

A close double star, on the Ram's horn, about 1½° from *β* on a line towards *β* Andromedæ. A 6, topaz yellow; B 8, smalt blue. South's observations encouraged an opinion of orbital motion = +0·12° per annum. But my observations do not confirm this, any more than do those of Σ. Nor do I think the stars are approaching each other, for the early distances of H., estimated by diameters of the stellar discs, were but approximations, since, exclusive of that important element the magnifying power, it would alter according to atmospheric and other circumstances at the time of observation. As an example of the method, we may here give the remarks for this star's distance: "With 227, about ¾ diameter of L; with 460, full 1¼, or about 1½ of L, when best seen."

[2° *np β*. This is Flamsteed's 1 Arietis: Smyth has departed from his usual custom in preferring a Piazzi number to a Flamsteed one.]

98.

χ CETI.

		h.	m.	s.			s.
R. A.		1	44	11	Prec.	+	2·95
Decl.	S	11°	13′·8		——	N	18″·02

Webb notes that this star forms a fine pair with 182 P.I. A 5, pale yellow; B 7½, bluish. But he has fallen into some error in regard to the identity of this object with Σ. 147, called, it is true, by Struve χ^1. Struve's χ^1 precedes the above, 10^m in R.A., and is ½° more to the S.

99. ζ CETI. LXIX.

	h.	m.	s.			s.
R. A.	1	46	2	Prec.	+	2·95
		°	′			″
Decl.	S	10	52·8	——	N	17·95

	Position.		Distance.		Epoch.
	°		″		
Smyth	40·4	...	165	...	1835·87
Burnham	40·6	...	185	...	1879·89

A bright star, with a distant companion, in a poor field. A 3, topaz yellow; B 9, white, with a small star to the *nf.* This object is in the midst of the Whale's body, whence it was called *baṭn Kaïtôs,* the belly of Cetus, by the Arabian astronomers. It is on the line from θ towards π, and about one-third of the distance from the former; and a ray carried from υ through ζ will stretch out to β Andromedæ. [The estimates of the magnitude of A vary much; Lalande, Argelander, Heis, 3; J. Herschel, 4·9; Bessel, 5.]

100. 191 P. I. CETI. (Σ. 178.) LXVIII.

	h.	m.	s.			s.
R. A.	1	46	11	Prec.	+	3·17
		°	′			″
Decl.	N	10	16·0	——	N	17·94

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	193·3	...	3·0	...	1828·96
Smyth	194·1	...	3·6	...	1834·99

A close double star. A 7½, and B 8, both lucid white. This beautiful object, though catalogued of the Whale, is on the fore leg of Aries; with a distant telescopic star near the vertical *sf,* and another near the parallel,—but the field is otherwise barren. It will readily be fished up, by drawing an imaginary line from α Trianguli through γ Arietis, and carrying it about 8½° to the southward, or nearly as far beyond.

101. 55 ANDROMEDÆ. LXX.

	h.	m.	s.			s.
R. A.	1	46	41	Prec.	+	3·57
		°	′			″
Decl.	N	40	11·1	——	N	17·92

	Position.		Distance.		Epoch.
	°		″		
Burnham	355·4	...	60·2	...	1879·84

A most delicate double star, on the Lady's right leg, about 3° from γ Andromedæ, a little S. of the line from that star towards β. A 5½, yellow; B [12]. This is designated by Sir J. Herschel as "a fine specimen of a nebulous star." It is singular that it was marked nebulous by Flamsteed. It sometimes had a *burred* aspect to my gaze, and the companion was only caught by intense attention, and then only by evanescent glimpses, being a *minimum visibile* for my telescope: its position and distance are therefore only estimated. Is the intense blue which some of these mere points of light present, an optical illusion?

The acolyte being of the last degree of faintness, it was necessary to avert the eye. H. accounts for the success of this stratagem, by supposing the lateral portions of the retina to be less exhausted than the central ones.

[" Not seen nebulous in 8½in refractor."—(*Brodie.*) "I could not perceive any nebulous surrounding to the large star."—*Burnham.*]

102. 241 B. ANDROMEDÆ. (Σ. 179.)

	h.	m.	s.			s.
R. A.	**1**	**46**	**41**	Prec.	+	3·50
		°	′			″
Decl.	**N**	**36**	**47·0**	——	N	17·99

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	160·4	...	3·4	...	1831·04
DUNÉR	159·9	...	3·4	...	1871·42

A double star. A 7, white; B 8½, white. The components are evidently fixed.

103. α TRIANGULI. LXXI.

	h.	m.	s.			s.
R. A.	**1**	**46**	**48**	Prec.	+	3·40
		°	′			″
Decl.	**N**	**29**	**2·6**	——	N	17·93

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	182·3	...	228	...	1879·85

A bright star with a telescopic companion. A 3½, yellow; B 11, lilac. This object is at the preceding angle of Deltōton, and, except a 10th mag. star near the *sf* vertical beyond B, is in a barren field. It is the apex of a large oblique-angled triangle, the base of which is formed to the *np* and *nf* by β and γ Andromedæ: and it is also 6° beyond α Arietis, on a line brought from γ Ceti. It was named by the Arabians *Rás al Mothallath*, or "Caput Trianguli."

Though small, Triangulum, Deltōton, or Trigōnus, is one of the ancient 48 asterisms, and is supposed to have derived its name from the Egyptian Delta; but others insist that the Triangle alludes to Trinacria, or Sicily;

an island favoured by Ceres, and whence her planet was revealed to Piazzi. The members have been thus numbered:

Ptolemy . . .	4 stars.	Flamsteed . . .	16 stars.
Bayer	5 „	Piazzi	25 „
Hevelius . . .	9 „	Bode	33 „

Several very old illustrations delineate Deltōton as an equilateral triangle, with a star at each angle—"in unoquoque angulo unum;" but it has latterly been drawn as a scalene figure. Anciently there was only a single triangle, but Hevelius took three other stars between it and the head of Aries, to form *Triangulum minus:* the figure, however, is discontinued. A line drawn from β Arietis to γ Andromedæ passes the *lucida Trianguli*, at about one-third of the distance.

104. γ ARIETIS. (Σ. 180.) LXXII.

	h.	m.	s.			s.
R. A.	**1**	**47**	**29**	Prec.	+	3·27
		h.	′			″
Decl.	**N**	**18**	**45·3**	——	N	17·89

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	356·0	...	10·17	...	1779·68
Smyth	359·8	...	8·8	...	1837·93
Struve, O.	356·4	...	8·60	...	1851·82
Doberck	358·6	...	8·32	...	1877·89

A neat double star, the duplicity of which was discovered by Dr. Hooke in 1664. A 4½, bright white; and B 5, pale grey. This fine object is placed at the lower bend of the Ram's horn, where it precedes β and α; it is followed in the *nf*, but nearly on the parallel, and about 3·5′ distant, by the 9th magnitude star which that astronomer describes.

From observations made by H̥., he concluded the orbital angle to have increased; but the subsequent measures indicate little or no change. It is certainly a beautiful pair, in a powerful instrument. "What would Cassini say," demands H̥., "if he were to view the first star of Aries, which appeared to him as split in two, through a telescope that will show η Corona Borealis and *h* Draconis to be double stars?"

Dr. Hooke mentions that the telescope shows some stars, which appear single, to consist of two or more, so close, that to the naked eye both the images falling upon one single filament of the *tunica retinæ* make but one impression upon the brain. "Of this kind," he continues, "the most remarkable is the star in the left horn of Aries, which, whilst I was observing the comet which appeared in the year 1664, and followed till he passed by this star, I took notice that it consisted of two small stars very near together: a like instance to which I have not else met with in all the heaven." Thousands are now known!

γ Arietis has been called the first star in Aries, because it was once the nearest to the equinoctial point: it was named Mesartim, owing to an erroneous deduction by Bayer from the word *Sartai*, a corruption of *Al Sharataïn*, which is the next star.

["Small change in angle and distance probable."—(*Gledhill.*) But I would rather limit this remark to the distance, which seems clearly to be diminishing, the angle remaining practically unchanged.]

105. 105 H. I. CETI. (h. 165, 2443; H. 431; R.)

	h.	m.	s.			s.
R. A.	1	47	39	Prec.	+	2·91
		°	′			″
Decl.	S	14	16·7	——	N	17·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; l E; psmb M;" which means:—"considerably bright; pretty large; little extended; pretty suddenly much brighter in the middle." Seen at Parsonstown "more extended than Sir J. Herschel describes it."

106. β ARIETIS. LXXIII.

	h.	m.	s.			s.
R. A.	1	48	33	Prec.	+	3·29
		°	′			″
Decl.	N	20	16·2	——	N	17·85

	Position.	Difference of R. A.	Epoch.
	°	s.	
SMYTH	198 ...	7·4 ...	1835·99

A bright star with a distant companion, in a barren field near the tip of the Ram's horn, being the middle one of the three stars known as the Ram's head A 3, pearly white; B 11, dusky; there is a still smaller star in the *sf* quadrant. This object was named *Sheratan* or *Sharaṭaïn*, the dual of *sharaṭ*, a sign, signifying γ and β, the two bright stars in the head of the Ram; with an interval between them and *a*, says Ḳazwíní, of two *kaus*, by eye-measurement: said *kaus* being used as synonymous with the astronomical ell of 2°. An imaginary line from the Pleiades to *a* Pegasi passes between them in the mid-distance of that line.

107. 56 ANDROMEDÆ. LXXIV.

	h.	m.	s.			s.
R A.	1	49	37	Prec.	+	3·52
		°	′			″
Decl.	N	36	42·2	——	N	17·81

	Position.	Distance.	Epoch.
	°	″	
MAIN	301·5 ...	181·6 ...	1865·81

A pair of stars between the Triangle and the Lady's right knee, both of the 6th magnitude, and both yellow. These stars are suspected of physical connection, principally on the ground that their identity of movement in space implies their union in some vast system. Their proper motions have been inquired into, and the following results registered by Baily:

A (=203 P. I.)	R. A. ″ + 0·06	Decl. ″ − 0·01
B (=204 P. I.)	„ + 0·24	+ 0·04

This object is readily identified by carrying a line from π Andromedæ through β, and extending it about 10° beyond the latter; and it is also nearly in mid-distance between γ Andromedæ and α Trianguli.

[Σ. in 1836 noticed the preceding star to be smaller and always deeper in colour, but Webb reversed this statement in 1850, and Sir J. Herschel agreed with Webb.]

108. 209 P. I. PISCIUM. (Σ. 186.) LXXV.

	h.	m.	s.		s.
R. A.	1	50	12	Prec. +	3·08
		°	′		″
Decl.	N	1	18·2	—— N	17·78

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	64·7	1·23	1831·12
Smyth	62·9	1·5	1833·83
Struve, O.	68·2	0·82	1846·11
Dawes	85·1	0·3	1863·85
Schiaparelli	Single	Single	1876·99
Burnham	169·0	0·31	1878·87

A close double star, on the *sf* extreme of the Fishes' *kheïṭ*, or ribbon; and it lies on a line shot from ζ Piscium to α Arietis, at about a third of the distance. A 7, silvery white; and B 7½, white. This is a very fine object, resembling η Coronæ.

["There can be no doubt that this double star, discovered by Σ., is a binary system."—*Dawes.*]

109. 32 ℌ. VII. ANDROMEDÆ. (h. 174; H. 457; ℜ.)

	h.	m.	s.		s.
R. A.	1	51	14	Prec. +	3·54
		°	′		″
Decl.	N	37	7·6	—— N	17·74

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vv L; Ri; st L and sc;" which means:—"a cluster; unusually large; rich; the stars large and scattered."

110. 584 Lac. HYDRI. (*h. 3475.)

R. A.	1h. 51m. 42s.	Prec. +	1s.·95
Decl.	S 60° 40′·8	—— N	17″·72

	Position.	Distance.	Epoch.
HERSCHEL, J.	37°·6	3″·3	1837·31

A double star. A 7; B 7. Lies nearly mid-way between *α* Hydri and *α* Eridani.

111. λ ARIETIS. LXXVI.

R. A.	1h. 51m. 47s.	Prec. +	3s.·33
Decl.	N 23° 3′·6	—— N	17″·72

	Position.	Distance.	Epoch.
HERSCHEL, W.	48°·0	36″·6	1779·83
SMYTH	45·6	36·9	1830·96
BURNHAM	45·5	37·5	1880·12

A fine double star, on the root of the Ram's horn; pointed at by a line through *γ* and *β*, and is the apex of an oblique triangle of which *α* and *β* form the base. A 5½, yellowish white; B 8, blue.

112. 112 H. I. ARIETIS. (h. 181; H. 463; R.) LXXVII.

R. A.	1h. 53m. 18s.	Prec. +	3s.·28
Decl.	N 18° 28′·3	—— N	17″·66

A round nebula, closely following *γ* on the neck of the Ram, where it may be fished for on a line carried from *α* Trianguli 4½° below λ Arietis. It is large and pale, but brightens in the centre. H. classed it in November, 1785, and considered it "not easily resolvable;" but still H. distinguished it through a thick cloud. It lies among some small stars, the most conspicuous of which form a curve across the S. part of the field.

["Large but very faint."—*Brodie.*]

113. 191 Σ. CASSIOPEIÆ.

R. A.	1h. 53m. 23s.	Prec. +	5s.·06
Decl.	N 73° 18′·8	—— N	17″·65

	Position.	Distance.	Epoch.
STRUVE, W.	190°·6	5″·6	1832·15
DUNÉR	191·3	5·3	1868·32

A double star. A 6½, white; B 9, blue. Stars presumably fixed. Dunér calls B "cendrée."

114. 222 P. I. ARIETIS. (Σ. 196.) LXXVIII.

R. A.	1h. 53m. 48s.	Prec. +	3·30s.
Decl.	N 20° 31′·4	—— N	17″·63

		Position.	Distance.	Epoch.
Smyth	A B	53°	2″	1834·99
	A C	165	40	
	A D	359	165	
Knott	A B	50·0	2·5	1862·95
	A C	166·3	37·3	
	A D	0·8	183·6	
Burnham	A D	0·7	183·8	1880·03

A quadruple star, in mid-distance between *a* and *γ*, under the Ram's ear, lying nearly at right angles with the vertical. A [9, blue]; B [12], deep blue; C 10, lilac; and D [6, topaz yellow]. This is an exquisite object, but most difficult to observe. Still, it forms an admirable test to try the light and distinctness of a telescope.

[" A B is probably unchanged: the distance between A C has diminished, while that between A D has considerably increased."—*Gledhill*. ? no alteration in AD.]

[I have revised Smyth's note so as to embody his son's corrections mentioned in *Edinburgh Obs.*, vol. xiv. p. 346.]

115. 101 ♅. I. CETI. (h. 183; H. 470; ℜ.)

R. A.	1h. 54m. 11s.	Prec. +	3·00s.
Decl.	S 6° 29′·6	—— N	17″·62

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; m E 163°; mb M;" which means:—" considerably bright; large; much extended in the direction of 163° with the meridian; much brighter in the middle."

116. 197 Σ. TRIANGULI.

R. A.	1h. 54m. 35s.	Prec. +	3·50s.
Decl.	N 34° 45′·7	—— N	17″·56

	Position.	Distance.	Epoch.
Struve	233°·6	18″·3	1833·48
Mädler	232·8	20·9	1853·09
Gledhill	233·0	22·1	1873·96

A double star. A 8, white; B 9, ashy. "The changes are due to the proper motion of the larger star." 2° *np* B Trianguli, of mag. 3½.

117. α PISCIUM. (Σ. 202.) LXXXI.

	h. m. s.		s.
R. A.	1 56 21	Prec. +	3·09
	° ′		″
Decl.	N 2 14·0	—— N	17·53

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	335·8	...	5·40	...	1821·89
Smyth	333·4	...	3·8	...	1838·87
Mädler	329·7	...	3·14	...	1852·12
Dembowski	325·7	...	3·17	...	1865·52
Schiaparelli	324·0	...	3·08	...	1877·04

A close double star, at the *sf* extreme of the ribbon of the Fishes, where it is readily identified by carrying a line from β Ceti over θ, and rather better than as far again to the N.W. It is also in mid-distance between υ Ceti and α Arietis. A 5, pale green; B 6, blue. [Dawes, white; white. According to Knott, colour of B uncertain or changeable. The most extraordinary diversities of tint are on record; and there is a general *consensus* of opinion now that this star is changing, angle and distance both diminishing.]

Pisces is one of the old 48 asterisms, and the 12th or last sign of the old zodiac. The constellation consists of 2 Fishes linked by a ribbon, or string, attached to their tails, and divided by Hevelius into *linum boreum* and *linum austrinum;* they occupy a large space in the firmament, the one being under the wing of Pegasus, and the other under the right arm of Andromeda, in the position described by Manilius:

> Dissimile est illis iter, in contraria versis.

The conspicuous rectangular figure in Pegasus is a guide to the position of these two Fishes; the line of α Andromedæ and γ Pegasi being parallel to the body of one Fish, and that of γ and α Pegasi to the body of the other. The equinoctial colure now passes through this "watery trigon," which was not a favourite sign with astrologers; indeed, Mr. John Gadbury,—albeit it was notorious that, under dominance of "ye Fysches," it was good to "wed a wyfe, and to trete frendys," —says, "I know Pisces to be a dull, treacherous, phlegmatic sign." Yet this visionary φιλομάθηματικος was consulted on mundane affairs by the Parliament of England! The star α—the Syndesmos of the Greeks —has been called *Okda*, from the *'Oḳdah al Kkaïṭaïn*, or "knot of the two threads," of the Arabian *savants*. The component members of Pisces have been thus stated:

Ptolemy . . .	38 stars.	Hevelius . . .	39 stars.
Tycho Brahé . .	36 ,,	Flamsteed . . .	113 ,,
Bayer	37 ,,	Bode	257 ,,

Eratosthenes considered that this asterism symbolized the Syrian

Derceto, and it has therefore been represented with a woman's head on a huge fish's body. The Scholiast on Aratus says, that the Northern Fish was figured with a swallow's head, and called Χελιδόνιας; while the two collectively were called *Gemini Pisces*, to distinguish them from the Southern Fish.

118. ε TRIANGULI. (Σ. 201.) LXXX.

		h.	m.	s.			s.
R. A.		**1**	**56**	**33**	Prec.	+	3·49
		°	′				″
Decl.	**N**	**32**	**45·2**		——	N	17·52

	Position.	Distance.	Epoch.
	°	″	
STRUVE	119·6	3·7	1833·11
SMYTH	110	5	1835·71
BURNHAM	116·8	4·1	1877·81

A most delicate double star, on the *np* limb of Deltōton; and a line projected from γ Andromedæ to pass between α and λ Arietis, will pass over it in about mid-distance. A 5½, bright yellow; B 15, dusky. This object was marked "difficilis" by Struve. It lies diagonally between two small stars, one of which, 10th magnitude, precedes it by $9{\cdot}0^{s}$; and the other, a deep orange-coloured 8th magnitude, follows by 14^{s}, with a little neighbour 2^{s} farther off.

119. γ ANDROMEDÆ. (Σ. 205.) LXXXII.

		h.	m.	s.			s.
R. A.		**1**	**57**	**8**	Prec.	+	3·65
		°	′				″
Decl.	**N**	**41**	**48·1**		——	N	17·50

		Position.	Distance.	Epoch.
		°	″	
HERSCHEL, W.	A B	70·4	9·25	1779·65
SMYTH	A B	62·9	10·6	1837·80
DEMBOWSKI	A B	63·2	10·43	1862·80
SCHIAPARELLI	A B	62·6	10·10	1877·11
STRUVE, W.	B C	126·6	0·51	1842·72
JACOB	B C	111·3	0·5	1852·78
TALMAGE	B C	106·3	0·58	1865·76
SCHIAPARELLI	B C	104·1	0·48	1877·05
GLEDHILL	B C	102·4	0·84	1877·94

A splendid double star, on the right ankle of Andromeda. A 3½, orange colour; B 5½, emerald green; and of these colours I feel pretty positive, although H. and Σ. pronounced them to be yellow and blue.

This beautiful object was seen to be double by C. Mayer in 1778. My results are sufficient to establish the relative fixity of these stars; although this is against the opinion, that high-coloured stars possess the greatest velocity. A is remarkable as forming, with a star in the head and another in the belt, an almost direct line, across the parallel, from E. to W.; it is called Al'mak, from the Arabic *Al-'Anáḳ-at-arḍ*, the "badger," or *caracal* of Buffon.

This star is readily found by drawing an imaginary line through the three stars of Orion's belt, and then over the Pleiades; or, a ray from α Draconis to the Pole-star, at about two-thirds the distance beyond, leads to it. Should Orion's neighbourhood be obscured, an occult line carried through β and α, the two brightest stars of Cassiopeia, and extended to rather more than five times their distance from each other, will strike upon Al'mak, after passing the star upon Andromeda's left ankle.

Struve, in October, 1842, detected γ Andromedæ to be triple, the companion composed of two stars of equal size, separated at that time by an interval of less than 0.5″.

[No change appears to have taken place in AB since its discovery, but with respect to BC the progressive diminution of the angle is manifest, and OΣ thinks an augmentation in the distance probable. To divide B is a difficult task for any refractor of less than 8$^{\text{in.}}$ As to the magnitudes of the components of B authorities differ much.]

120. 10 ARIETIS. (Σ. 208.) LXXXIII.

R. A.	1h 57m 23s	Prec. +	3·37s
Decl.	N 25° 24·3′	—— N	17·48″

	Position.	Distance.	Epoch.
STRUVE, W.	25·3° ...	1·98″ ...	1833·05
SMYTH	26·8 ...	2·2 ...	1838·66
MÄDLER	32·6 ...	1·54 ...	1850·99
DOBERCK	43·0 ...	1·16 ...	1878·08

A close double star, over the Ram's head, nearly in mid-distance between α Trianguli and α Aretis, and it has several followers exactly on the parallel. A 6½, yellow; B 8½, pale grey. This is one of Σ.'s discoveries, and so beautiful an object, that H. calls it a miniature of ε Bootis.

[An increase of angle seems certain, and a decrease of distance probable.]

121. 61 CETI. LXXXIV.

	h.	m.	s.		s.
R. A.	1	58	10	Prec. +	3·06
		°	′		″
Decl.	S	0	51·9	—— N	17·45

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	A B 193·6	37·8	1782·78
Smyth	A B 188·8	39·0	1834·88
	C D 249·8	4·6	
Burnham	A B 193·3	42·7	1877·86

A pair of double stars, at the back of the Whale's head, and 3° to the S., a little following α Piscium. A line from τ Ceti through ζ, carried nearly double the distance, hits 61. A 7, pearly white; B 11, greenish; C 7, white; and D 8½, blue. [Estimates of magnitude of A fluctuate through more than a unit.—*Gould.*]

The above measures must imply a slight change in the orbital curve, but the difficulty of the measures must be taken into consideration.

Near the following parallel, at a distance of 4^{m} 57^{s}, on the angular line = 102° 33′, is the beautiful double star C D, which proved to be Σ. 218, of which other measures are:

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	250·0	4·7	1832·36
Dawes	248·3	4·9	1854·07

122. α ARIETIS. LXXXV.

	h.	m.	s.		s
R. A.	2	0	58	Prec. +	3·35
		°	′		″
Decl.	N	22	56·6	—— N	17·32

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	107	19·5	1835·10

A *Nautical Almanac* star, on the Ram's *os frontis.* A 3, yellow; B 11, purple. The large star is followed by three small ones, forming a line across the parallel, of which the middle individual is B.

Though this constellation only possesses stars of more interest than magnitude, it opened the astronomical year, 2000 years ago, as *Princeps signorum* and *Ductor exercitûs zodaici;* and bore the office for a similar period. The charge is now resigned to Pisces, for Aries has passed 30° to the eastward of the point where the equinoctial is intersected by the ecliptic, or *Via Solis.* This is owing to the precession of the equinoxes, which apparent motion of the zodiac arises from a slow vibration of the earth's axis, occasioned by planetary attraction.

Thomas Hood, the Fellow of Trinity College, Cambridge, who published directions for using the celestial globe, in 1590,—and who considered the Triangle as only placed in the heavens in order that the head of Aries might be better known—thus speaks of its first star:

"*Scholar.* Why is that same starre placed so farre from the head of Aries? me thinketh it were good to keepe the figure and the signe together.

"*Master.* That cannot be; for the starres moving continually from the west towards the east, cannot keepe one and the same distance from the vernall equinoctiall point, but are carried on forward continually, so that the starres which are now in the signe *Aries* will be hereafter in *Taurus*, and from thence will come into *Gemini*," &c.

Aries indicates the golden fleece of the adventurous crew of the Argo, albeit a stir has been made to identify him as Abraham's ram; and he is recognisable by three stars crossing the head obliquely. The Ram has long been figured in his present attitude, for Manilius accurately describes him as advancing stern foremost, with his legs bent under:

First Aries, glorious in his golden wool,
Looks back, and wonders at the mighty bull.

The star under discussion was called *Hamal* by the Arabs, *i.e.* a sheep. A line made to pass between the Pleiades and Hyades, from α Andromedæ, will pick up Hamal in the mid-distance, and pass through the Ram's flank; it may also be identified by the brackish rhymes:

From Ras Mothallath shoot a ray, in a south-following line,
And where expand huge Cetus' jaws to *gamma* let it join;
One-fourth the distance thus express'd from Triangle to Whale,
(If thus can such odd fish be termed,) will strike upon Hamal.

The stars of Aries have been thus enumerated:

Ptolemy	18 stars.	Hevelius	27 stars.
Tycho Brahé	21 ,,	Flamsteed	66 ,,
Kepler	23 ,,	Bode	148 ,,

123. 152 H. I. ARIETIS. (h. 193; H. 487; ℞.)

	h.	m.	s.			s.
R. A.	2	1	26	Prec.	+	3·19
		°	′			″
Decl.	N	10	27·9	——	N	17·30

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; v S; vl E; svmb M; * 10, 55″ 320°;" which means:—"bright; very small; very little extended; suddenly very much brighter in the middle; there is a 10th mag. star at a distance of 55″ on an angle of 320°." D'Arrest found this object too faint for his $4\frac{1}{2}$in Leipzig refractor, but it is classed as "bright" by Sir J. Herschel from a mean of 3 observations.

124. 14 ARIETIS. LXXXVI.

	h.	m.	s.		s.
R. A.	2	3	9	Prec. +	3·39
		°	′		″
Decl.	N	25	25·3	—— N	17·23

		Position.	Distance.	Epoch.
		°	″	
South	A C	277·9	105·2	1823·97
Smyth	A B	43·5	82·6	1833·92
	A C	278·6	106·5	

A wide triple star, between the head of Aries and the base of Triangulum; being the centre of the group mentioned as headed by 10 Arietis, above described. A 5½, white; B 10½, blue; and C 9, lilac. A is the apex of a scalene triangle, with B in the *nf* and C in the *np* quadrant, in a field otherwise barren; but immediately followed on the parallel of A by 16 Arietis.

125. 59 ANDROMEDÆ. (Σ. 222.) LXXXVII.

	h.	m.	s.		s.
R. A.	2	4	12	Prec. +	3·62
		°	′		″
Decl.	N	38	31·2	—— N	17·18

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	34·8	15·2	1783·48
Smyth	34·7	16·3	1835·11

A neat double star, between the right foot of Andromeda and the Triangle; which may be readily identified by running a line from α, close under β, till it arrives nearly at right angles with γ. A [6½], bluish white; B [7], pale violet.

[The above observations tend to show the fixity of this object.]

126. 55 CASSIOPEIÆ. LXXXVIII.

	h.	m.	s.		s.
R. A.	2	5	51	Prec. +	4·64
		°	′		″
Decl.	N	66	0·5	—— N	17·11

		Position.	Difference of R. A.	Epoch.
		°	s.	
Smyth	A B	24	1·8	1834·63
	A C	120	23·8	

A star with two distant companions, in the Lady's right foot; or, including an orange-coloured 8th magnitude star near the N. vertical, a quadruple object. A 6, yellowish; B 11, and C 9, both greyish. It can be identified by passing an imaginary line from α through the two ν's, and carrying it about three times that distance to the N. E.

To the northward of this object, in the open space under the *sca-*

bellum, a new star suddenly burst forth in full splendour, in November, 1572; and the locality ought to be diligently watched.

Tycho Brahé, Kepler, Beza, Maurolycus, and other exact spectators, wrote dissertations upon it; but to all the reasonings as to why it had not been seen before, Reisacher's answer is perhaps the best: "God knows." Dr. Dee started the idea that it moved alternately towards, and from the earth, in a direct line.

[Hind and Plummer pointed out in 1873 that there existed then within 1′ of the place assigned by Argelander to Tycho's star, a small star sensibly variable.]

As there are vague impressions that similar stars appeared in 945 and 1264, Sir J. Herschel thought it possible another such appearance might take place in 1872, or thereabouts. [Hence the fact that attention was directed to the matter in 1873, as noted above.]

127. ι TRIANGULI. (Σ. 227.) LXXXIX.

	h. m. s.		s.
R. A.	**2 5 59**	Prec. +	3·47
Decl.	**N 29° 47′·2**	—— N	17″·11

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	79·1	...	3·02	...	1821·03
Smyth	78·8	...	3·5	...	1838·99
Secchi	76·9	...	3·56	...	1855·89
Doberck	75·6	...	3·86	...	1877·85

A fine close double star, under the base of the Triangle, and 4½° S. of β, on a line leading through β to γ Andromedæ. A 5½, topaz yellow; B 7, green.

[The recorded observations are too contradictory to make it certain that the angle has really altered, though those which happen to be cited above seem to imply that it has.]

128. 259 B. ANDROMEDÆ. (Σ. 228.)

	h. m. s.		s.
R. A.	**2 6 59**	Prec. +	3·80
Decl.	**N 46° 56′·1**	—— N	17″·06

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	262·1	...	1·08	...	1831·46
Struve, O.	274·7	...	1·32	...	1841·94
Mädler	280·2	...	1·11	...	1852·19
Dembowski	286·4	...	0·75	...	1862·79
Dunér	311·4	...	0·52	...	1875·20

A double star. A 7, white; B 8, white. Dunér says:—" Cette étoile est indubitablement binaire, et le mouvement est dejà très-rapide. . . . D'après ces formules le compagnon était au *maximum* de distance en 1846 ou 1847, et s'approche maintenant avec rapidité au *minimum*. Bien loin d'avance l'étoile sera probablement simple même dans les lunettes les plus puissantes. Il est donc très important de la suivre aussi longtemps que possible. Peut-être pourra-t-on bientôt en calculer une orbite, pas trop incertaine."

129. 66 CETI. (Σ. 231.) XC.

		h. m. s.			s.
R. A.		**2 7 8**	Prec.	+	3·03
		° ′			″
Decl.	**S**	**2 54·3**	——	N	17·05

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	226·1	...	16·17	...	1822·90
Struve, W.	228·9	...	15·54	...	1832·67
Smyth	229·6	...	15·4	...	1837·89
Winnecke	228·4	...	15·35	...	1857·87
Doberck	229·8	...	*not taken*	...	1876·07

A neat double star, on the neck of Cetus, nearly in mid-distance between γ and θ. A 7, pale yellow; B 8½, sapphire blue.

[Both stars are affected by a considerable proper motion; 1½° preceding *o* Ceti, a little N.]

130. 28 B. TRIANGULI. (Σ. 232.)

		h. m. s.			s.
R. A.		**2 8 17**	Prec.	+	3·46
		° ′			″
Decl.	**N**	**29 53·1**	——	N	17·00

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	245·5	...	6·56	...	1832·03
Mädler	246·4	...	6·45	...	1843·67
Dembowski	247·2	...	6·49	...	1856·83
Dunér	248·4	...	6·41	...	1869·86

A double star. A 8, very white; B 8, very white.

131. χ PERSEI. XCI.

		h. m. s.			s.
R. A.		**2 10 20**	Prec.	+	4·15
		° ′			″
Decl.	**N**	**57 0·1**	——	N	16·90

		Position.		Distance.		Epoch.
		°		″		
South	A C	136·5	...	124·5	...	1824·99
Burnham	A B	352·8	...	70·5	...	1879·54
	A C	136·3	...	122·6		

A coarse triple star, in the weapon hand of Perseus. A 6½, yellow;

B 12, bluish; C 9½, greenish. An imaginary line projected from δ Cassiopeiæ to *a* Persei will pass just below χ, at one-third of the distance. This is a multiple object, among rich fields, where the intermixture of greater and less individuals renders the vicinity very favourable for testing the light and definition of a telescope. A and C were measured by Sir James South in 1824, but he did not perceive B.

132. 38 [and 39] P. II. TRIANGULI. (Σ. 239.) XCIII.

R. A.	2h 11m 6s	Prec. +	3s·54
Decl.	N 28° 14'·3	—— N	16''·86

	Position.	Distance.	Epoch.
Herschel, J., and South	208°·9	14''·3	1821·96
Smyth	209·1	14·1	1834·92

A fine double star, between the Ram and the Triangle, where it will be found by shooting a line from *a* Andromedæ through *a* Trianguli, and extending it nearly 5° beyond: it is also near the mid-distance between γ Andromedæ and γ Ceti. A 8½, and B 9, both silvery white.

133. 33 ♅. VI. PERSEI. (h. 207; H. 512; R.) XCII.

R. A.	2h 11m 20s	Prec. +	4s·16
Decl.	N 56° 38'·5	—— N	16''·85

	Position.	Distance.	Epoch.
Smyth	321°·9	9''	1836·78

A delicate double star, in the glorious cluster of Perseus's weapon hand. A 8, white; B 10, pale grey. This brilliant mass of stars, from 7th to 15th magnitudes, fills the whole field of view, and emits a peculiarly splendid light. In the centre is a coronet, or rather ellipse, of small stars, above an 8th magnitude one, which, with its *np comes*, is here measured. The 7th magnitude star which follows is handsome from the blackness of the space immediately around it. A line from *a* Persei carried to δ Cassiopeiæ passes over this brilliant assemblage, at two-thirds the distance. Sir W. Herschel considered it a

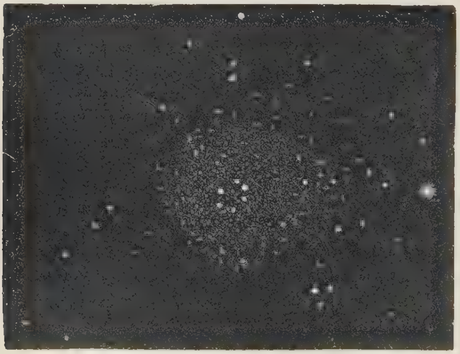

Fig. 3. 33 ♅. VI. Persei.

protuberant part of the Milky Way, in which it is situated; and analogy indicates that it is comparatively near.

This is followed by another gorgeous group of stars, from the 7th to the 15th magnitudes, at about 3^m, and nearly on the parallel. It is 34 H. VI. (= h. 212; H. 521). The components gather most towards the centre, but there is little disposition to form; the sprinkle, however, is in a direction parallel to the equator. One of the central individuals is of a fine ruby colour, and a 7th magnitude in the *nf* is of a pale garnet tint; with two sparkling but minute triplets S. of it. These two clusters are quite distinct, though the outliers of each may be brought into the same field under rather low powers; and, on the best nights, the groups and light are truly admirable, affording together one of the most brilliant telescopic objects in the heavens. It is impossible to contemplate them and not infer, that there are other laws of aggregation than those which obtain among the more scattered and insulated stars.

[Often called "The Cluster in the Sword-handle of Perseus."]

134. *o* CETI. XCIV.

	h.	m.	s.			s.
R. A.	**2**	**13**	**47**	Prec.	+	3·02
		°	′			″
Decl.	**S**	**3**	**28·7**	——	N	16·73

	Position.		Distance.		Epoch.
	°		″		
SMYTH	88·9	...	116·0	...	1831·03
BURNHAM	82·4	...	115·9	...	1878.92

A flushed yellow variable star, with a distant companion. A, recorded in extremes varying from 2 to 7, and from thence to invisible; B 10, pale lilac. This very extraordinary object is in the middle of the Whale's neck, and well known as *Mira;* the epithet "wonderful" being given on account of its remarkable variation in brilliance, first noticed, in 1596, by David Fabricius. Forty-two years afterwards it was observed by Phocylides Holwarda, and treated of in his *Πανσέληνος* as a new star, in a right line with *lucida mandibulæ Ceti.* Bailly thus relates the circumstance: "En 1638, Holward revit l'étoile de la Baleine, et à peu-près au même lieu où elle avait été apperçue par Fabricius. Il ignoroit sa première apparition, il la perdit lorsqu'elle se cacha dans les rayons du soleil; et lorsque cet astre, en s'avançant dans l'écliptique, eût rendu visibles les étoiles de la Baleine, Holward ne retrouva plus son étoile, quoiqu'il la cherchât avec soin; mais il dût être étonné de la revoir tout-à-coup le 7 Novembre, 1639. On la vit les années 1644, 45, 46, 47, 48, avec des alternatives de disparition et de renaissance, telles qu'on ne la vit jamais une année de suite. Hévélius la suivit constamment en 1648 et en 1660." Since this time it has been found pretty regular in its periods, except in

the four years 1672 to 1676, during which time Hevelius could not perceive it, though it was a particular object of his attention. Bullialdus determined its periodical time, from bright through all its gradations to bright again, to be 333 days, and Cassini made the same period to be 334. Halley mentions that it was found to appear and disappear periodically; and that its period is "precisely enough, seven revolutions in six years, though it returns not always with the same lustre. Nor is it," he adds, "ever totally extinguished, but may at all times be seen with a six-foot tube."

[This last-named statement is not correct. For fuller particulars see my *Handbook of Astronomy*, 3rd ed., p. 497.]

Count de Hahn thought he saw another companion, but I could not detect it. We are also told that Mira alters its colour with its magnitude, yet it was always reddish in my telescope.

A line led from α Geminorum through α Tauri, till it meets another shot from γ Andromedæ by α Arietis, will point out the place of this body to the casual gazer, by whom, however, it is rarely picked up. It is exactly in the direction, and half-way between γ and ζ Ceti.

135. 19 ♅. V. ANDROMEDÆ. (h. 218; H. 527; Ꝁ.) XCV.

	h. m. s.		s.
R. A.	**2 15 41**	Prec. +	3·73
Decl.	**N 41° 50′·0**	—— N	16″·64

An elongated nebula, on the Lady's right foot, where a line from β Persei to γ Andromedæ passes under it, at about two-thirds of the distance. This wonderful object was most indistinctly seen, though watched with a set attention on a glorious night, with the telescope in the highest possible order: yet it was discovered by Miss Herschel in August, 1783, with a Newtonian sweeper of only 27 inches focal length, charged with a magnifying power of 30. Sir William Herschel describes it as having a black division or chink, in the middle; and in my telescope it is certainly brighter at the edges than along the central part. Sir J. Herschel (No. 218 of 1833 *Catalogue*) has given a beautiful drawing of its aspect in the 20ft reflector, and concludes that it is a flat ring, of enormous dimensions, seen very obliquely. It consists, probably, of myriads of solar systems at a most astounding distance from ours, and affords a distinct lesson that we must not limit the bounds of the universe by the limits of our senses. The adjoining sketch gives a slight notion of it.

Fig. 4. 19 ♅. V. Andromedæ.

[At Parsonstown the sides of this object are seen to be certainly joined together only at the N. end.]

[Query, variable? "Could only just trace *something* with $7\frac{1}{2}^{in}$ in 1856; could barely see it with $8\frac{1}{2}^{in}$ in 1864."—*Brodie.*]

[Engraved in *Phil. Trans.*, 1833, Pl. ii. Fig. 28; Rosse, *Phil. Trans.*, 1861, woodcut.]

136. 61 P. II. ANDROMEDÆ. XCVI.

	h. m. s.		s.
R. A.	2 15 59	Prec. +	3·70
Decl.	N 40° 54′·0	—— N	16″·63

	Position.		Distance.		Epoch.
	°		″		
Smyth	355·0	...	50·0	...	1836·69
Dawes	355·2	...	49·0	...	1842·76
Burnham	358·1	...	53·4	...	1880·05

A wide double star, closely following No. 135, and about one-third the distance from γ Andromedæ to β Persei. A 7, yellow; B 11, pale lilac. This object was examined on seeing Piazzi's note of *proxime* to an 8th magnitude star closely following the N. vertical at about 8′ distance, which I am satisfied is No. 62 of his Catalogue; although its mean place from A is found to be at an angle of 3° 5′ and at a distance of 283″. Between these two there are three other small stars, which the Palermo telescope overlooked; the nearest of which is here measured.

[About $\frac{1}{3}$ from γ Andromedæ towards β Persei.]

137. 153 H. I. CETI. (H. 536.)

	h. m. s.		s.
R. A.	2 17 59	Prec. +	2·77
Decl.	S 21° 44′·1	—— N	18″·53

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; v L; E 0° . . . 90°;" which means:—"considerably bright; very large; extended in the direction of 0° towards 90° with the meridian."

138. 72 P. II. CASSIOPEIÆ. (Σ. 262.) XCVII.

	h. m. s.		s.
R. A.	2 20 0	Prec. +	4·86
Decl.	N 66° 54′·4	—— N	16″·43

		Position.	Distance.	Epoch.
		°	″	
Smyth	A B	274·2	2·1	1834·83
	A C	107·1	7·5	
Dembowski	A B	268·9	1·45	1855·90
	A C	109·5	8·91	
Gledhill	A B	265·3	1·8	1873·94
	A C	109·0	7·9	

A beautiful triple star, under the Lady's right foot, and more than mid-distance between α Persei and γ Cephei. A 4½, pale yellow; B 7, lilac; and C 9, fine blue; the individuals running nearly in a line, with the colours well contrasted. There has been a little confusion as to the identity of this object, H. having entered it as 55 Cassiopeiæ, and others calling it ι; but it is quite clear that it is as above named, and No. 292 of the British Catalogue; where, as a note shows, it gave Baily some trouble. When H. first enrolled it, he overlooked B.

[Secchi considers it certain that the angle of A B is ~~increasing~~ decreasing; but he is doubtful as to A C having any motion.]

139. 23 H. IV. CETI. (h. 223; H. 544; R.) XCVIII.

		h.	m.	s.			s.
R. A.		2	21	57	Prec.	+	3·04
			°	′			″
Decl.	S		1	38·0	——	N	16·35

A planetary nebula, in the middle of the Whale's neck. It is round, bluish white, and pale, but very distinct, and brightening towards the centre. This object is situated equatorially between two very small stars; and four larger, due N., form the letter L. It is about 7° from γ Ceti on the line leading upon ζ.

[Engraved in D'Arrest's Dissertation, 1861, Pl. ii. Fig. 7.]

140. 13 TRIANGULI. (Σ. 269.) XCIX.

		h.	m.	s.			s.
R. A.		2	22	21	Prec.	+	3·50
			°	′			″
Decl.	N		29	26·1	——	N	16·31

	Position.	Distance.	Epoch.
	°	″	
Smyth	342·1	2·3	1834·11
Plummer	342·2	1·61	1876·91

A close double star; being the northern of a small trapezium of telescopic stars, lying in the direction of a line carried from γ Arietis through α—the first and third stars in the Ram's head—and extended about two-thirds farther. A 6½, yellow; B 10, grey. This exquisite and difficult object was discovered by H.; but he only estimated a position and distance, which, however, approximate so nearly, that no motion can be assumed from the recent measures.

[Erroneously designated by Smyth "93 P. II." Owing to this mistake he fell into another, and thought the star he had measured was different from 89 P. II, whereas it is that very star.]

141. 154 H. I. ANDROMEDÆ. (h. 226; H. 549; B.)

	h.	m.	s.		s.
R. A.	2	24	8	Prec. +	3·65
		°	′		″
Decl.	N	36	38·3	—— N	16·22

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"cB; L; E; vgbM;" which means:—"considerably bright; large; extended; very gradually brighter in the middle."

142. 96 P. II. ARIETIS. (Σ. 271.) C.

	h.	m.	s.		s.
R. A.	2	24	13	Prec. +	3·43
		°	′		″
Decl.	N	24	44·9	—— N	16·21

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	180·5	11·8	1831·75
SMYTH	182·0	12	1832·06

A very delicate double star, over the Ram's back, and nearly in mid-distance between the Pleiades and *a* Andromedæ, where it is intercepted by a line from *β* Arietis (the middle star of the Ram's head) to the lucida of Musca. A 6½, pearl white; and B 14, blue. This fine object is in a poor field, with a 9th magnitude star in the *nf* quadrant, between which and A, a little following, is another of the 13th.

143. 227 h. PERSEI. (h. 227; H. 553.) CI.

	h.	m.	s.		s.
R. A.	2	25	36	Prec. +	4·29
		°	′		″
Decl.	N	57	2·4	—— N	16·14

An irregular but pretty rich cluster, on the weapon arm of Perseus, and in a fine vicinity. It consists of individuals from the 9th to the 15th magnitudes, preceded by some largish outliers, one of which is of a red tinge. It may be fished up about 10° *np a* Persei, nearly in the mid-distance of a line shot from Polaris to the west of Algol. A 7th magnitude in the *np* quadrant is the avant-courier of this field, and three of the 11th magnitude form so correct a line in the *nf* as to attract attention.

[Brodie describes this as "insignificant."]

144. 122 P. II. FORNACIS. (*h. 3506.)

	h.	m.	s.			s.
R. A.	**2**	**29**	**1**	Prec.	+	2·63
		°	′			″
Decl.	**S**	**28**	**42·7**	——	N	15·96

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	241·7	11·1	1836·34
STONE, O.	243·4	11·4	1877·74

A double star. A 5½; B 8.

145. 2487 h. ERIDANI. (H. 567.)

	h.	m.	s.			s.
R. A.	**2**	**29**	**12**	Prec.	+	2·40
		°	′			″
Decl.	**S**	**39**	**31·3**	——	N	15·96

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; L; pm E; smb M; bi-N;" which means:—"pretty bright; large; pretty much extended; suddenly much brighter in the middle; bi-nuclear."

This may or may not be 519 Dunlop. It is engraved in the *Cape Obs.*, Pl. vi. Fig. 14.

146. ν CETI. (Σ. 281.) CII.

	h.	m.	s.			s.
R. A.	**2**	**30**	**5**	Prec.	+	3·14
		°	′			″
Decl.	**N**	**5**	**6·8**	——	N	15·91

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	83·3	7·7	1831·92
SMYTH	85	6	1833·88
DUNÉR	82·2	7·7	1868·48

A double star, in the Whale's eye, about 3° from γ Ceti, slightly preceding a line from γ towards β Arietis, the middle star of the Ram's head. A 4½, pale yellow; B 10, blue. This very delicate object is one of those marked by Σ. "difficilis;" and not without reason, for the *comes* can only be seen by glimpses, on ardent gazing; and its details are therefore mere estimations. It is followed exactly on the parallel, Δ R. A. = 25^s, by a dusky star of the 11th magnitude.

["The magnitude of B is greater than Smyth gives it."—*Brodie.*]

["I found it easy with 5½in, 1861."—*Webb.*]

147. 30 ARIETIS. (Σ. 5 App. I.) CIII.

	h.	m.	s.		s.
R. A.	2	30	37	Prec. +	3·43
		°	′		″
Decl.	N	24	10·2	— N	15·88

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	272·4	...	38·4	...	1821·99
SMYTH	273·0	...	38·3	...	1837·80
MAIN	274·5	...	38·3	...	1865·81

A fine double star, over the Ram's back, in the line from *a* Trianguli towards *a* Boötis, and about one-fourth of the distance; it is also pointed out by a ray leading from *γ* Pegasi to *a* Arietis, and carried about 7° beyond. A 6, topaz yellow; B 7, pale grey; and Piazzi's 128 is on the following parallel, 44″ off. The fixity of this star may be presumed.

30 Arietis is the most southern of a group of about a dozen double stars, spread over the adjoining portions of the three constellations—Aries, Musca, and Triangulum—with extensive patches of dark and blank space between them.

148. 102 H. I. CETI. (h. 244; H. 574; R.)

	h.	m.	s.		s.
R. A.	2	33	5	Prec. +	2·97
		°	″		″
Decl.	S	7	9·4	— N	15·74

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; v R; mb M;" which means:—"considerably bright; pretty large; very round; much brighter in the middle." D'Arrest found this object less bright than Sir J. Herschel's notes imply.

149. 156 H. I. PERSEI. (h. 242; H. 575.) CIV.

	h.	m.	s.		s.
R. A.	2	33	30	Prec. +	3·73
		°	′		″
Decl.	N	38	34·4	— N	15·77

An elongated *lenticular* nebula, *sp* the head of Medusa, and pointed out by a line led from the Hyades through the Pleiades, and carried twice their distance further. Though pale, it is very distinct in my instrument, and elliptical, not—as the 20ft reflector defined it—lenticular; an appearance owing, perhaps, to its being a vast ring lying obliquely to our line of vision. It trends *nf* and *sp*, and is accompanied by many small stars, of which the nearest is a 10th magnitude, due S. A notion of its form is afforded by the sketch.

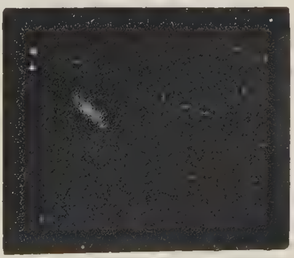

FIG. 5. 156 H. I. PERSEI.

[Engraved in *Phil. Trans.*, 1833, Pl. vi. Fig. 56; *Phil. Trans.*, 1861, Pl. xxv. Fig. 5.]

150. 33 ARIETIS. (Σ. 289.) CV.

	h. m. s.		s.
R. A.	2 34 15	Prec. +	3·48
	° ′		″
Decl.	N 26 35·4	—— N	15·69

	Position. °	Distance. ″	Epoch.
Herschel, W.	2·8	25·5	1779·74
Herschel, J., and South	1·7	29·1	1822·08
Smyth	0·2	28·5	1832·12
Wilson and Seabroke	0·9	29·1	1873·94

A fine double star, over the back of Aries, but in the space assigned to Musca; lying nearly mid-way between the Pleiades and *β* Andromedæ. A 6, pale topaz; B 9, light blue. There may exist a slow orbital motion, but the inference that the stars are receding from each other cannot be supported, as ℍ. marked his distance "inaccurate."

["9 seems very small."—*Webb.*]

151. 66 ℍ. VIII. CASSIOPEIÆ. (H. 578.)

	h. m. s.		s.
R. A.	2 34 18	Prec. +	4·57
	° ′		″
Decl.	N 61 4·5	—— N	15·68

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; sc st, one 10;" which means:—"a cluster; large; stars scattered, one of them is of the 10th magnitude."

152. 34 M. PERSEI. (h. 248; H. 584; 𝔎.) CVI.

	h. m. s.		s.
R. A.	2 34 57	Prec. +	3·83
	° ′		″
Decl.	N 42 15·7	—— N	15·70

	Position. °	Distance. ″	Epoch.
Burnham	249·3	20·2	1880·05

A double star in a cluster, between the right foot of Andromeda and the head of Medusa; where a line carried from Polaris between *ε* Cassiopeiæ and *α* Persei to within about 2° of the parallel of *β* Persei will meet it. A and B, 8th magnitudes, and both white. It is in a scattered but elegant group of stars from the 8th to the 13th degree of brightness, on a dark ground, and several of them form into coarse pairs.

This was first seen and registered by Messier, in 1764, as a "mass of small stars;" and in 1783 was resolved by Sir W. Herschel with a 7ft reflector: with the 20ft he made it "a coarse cluster of large stars of different sizes." By the method he applied to fathom the Galaxy, he concluded the profundity of this object not to exceed the 144th order.

["Just perceptible to the naked eye; a very grand low-power field, one of the finest objects of its class."—*Webb.*]

153. 12 PERSEI. CVII.

	h. m. s.			s.
R. A.	2 35 18	Prec.	+	3·76
Decl.	N 39° 43′·7	——	N	15″·62

	Position.		Distance.		Epoch.
Herschel, W.	B C 212°·0	...	21″·98	...	1782·30
Smyth	B C 209·8	...	22·9	...	1833·85
Main	B C 204·4	...	23·1	...	1863·80

A pointer to a double star (=Σ. 292) in the *nf* quadrant, with Δ R.A. 10s, preceding the head of Medusa; and a line led through κ and γ Cassiopeiæ passes over it between β Persei and γ Andromedae. A 6, yellow; B 7½, pale blue; C 8, lilac. Its fixity may be held to be proved; and it must be rated as an optical object, or one which is casually juxtaposed in the heavens. Still the components must be within a distance of each other which imagination may compass, since their relative brightness is apparently so nearly the same. A bright star, distant upwards of 4′ in the *sp* quarter, is South's C; and still nearer to A is a pair of 10th magnitudes, on the parallel with each other.

154. 84 CETI. (Σ. 295.) CVIII.

	h. m. s.			s.
R. A.	2 35 35	Prec.	+	3·05
Decl.	S 1° 9′·8	——	N	15″·60

	Position.		Distance.		Epoch.
Struve, W.	334°·6	...	4″·85	...	1831·90
Smyth	334·5	...	5	...	1833·97
Secchi	330·6	...	4·57	...	1858·03
Doberck	325·0	...	4·75	...	1877·84

A very delicate double star on the Whale's under-jaw; between α and ζ Ceti. A 6, pale yellow; B 14, lilac, with several minute stars in the field. My observations, from the difficulty of the object, are little better than estimations.

[A slow retrograde motion seems probable.]

155. 63 H. I. CETI. (h 254, 2493; H. 589; R.)

		h.	m.	s.			s.
R. A.		2	35	40	Prec.	+	2·94
Decl.	S	8°	43′·5		——	N	15″·60

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; R; mbM * 12;" which means:—"bright; pretty large; round; much brighter in the middle, where there is a 12th mag. star."

156. θ PERSEI. (Σ. 296.) CIX.

		h.	m.	s.			s.
R. A.		2	36	41	Prec.	+	4·03
Decl.	N	48°	45′·8		——	N	15″·55

		Position.		Distance.		Epoch.
		°		″		
HERSCHEL, W.	A B	290·0	...	13·52	...	1782·64
STRUVE, W.	A B	294·6	...	15·40	...	1832·20
WILSON and SEABROKE	A B	296·0	...	16·5	...	1873·93
	A C	215·3	...	*not taken*		
BURNHAM	A C	218·5	...	68·8	...	1879·54

A triple star in a rich field on the Hero's right shoulder; and nearly in mid-distance between β Persei and δ on the knee of Cassiopeia. A 4, yellow; B 13, violet; C 11, grey. H. mentions a third star within 1′ towards the S.; but both he and Σ. measured the object only as double.

157. 77 M. CETI. (h. 262; H. 600; R.) CX.

		h.	m.	s.			s.
R. A.		2	37	3	Prec.	+	3·06
Decl.	S	0°	28′·3		——	N	15″·51

A round stellar nebula, near δ in the Whale's lower jaw, and about 2½° from γ on the line towards ε, or S. by W. This was first classed by M. in 1780 as a mass of stars containing nebulosity. It is small, bright, and exactly in a line with three small stars, one preceding and two following, of which the nearest and largest is a 9th magnitude to the *sf.* There are other minute companions in the field; and the place is differentiated from γ Ceti.

This object is wonderfully distant and insulated, with presumptive evidence of intrinsic density in its aggregation; and bearing indication of the existence of a central force, residing either in a central body or in the centre of gravity of the whole system. Sir W. Herschel says,—"From the observations of the large 10^{ft} telescope, which has a gauging power of 75·82, we may conclude that the profundity of the nearest part is at least of the 910th order." That is, 910 times as far off as the stars of the 1st magnitude!

[But this is highly imaginative, to say the least of it. The Earl of Rosse noted this as a spiral neb.

Engraved in *Phil. Trans.*, 1861, Pl. xxv. Fig. 5; Rosse, Dublin *Trans.*, 1879, Pl. i. Fig. 600.]

158. γ CETI. (Σ. 299.) CXI.

		h.	m.	s.			s.
R. A.		**2**	**37**	**36**	Prec.	+	3·11
		°	′				″
Decl.	**N**	**2**	**33·5**		——	N	15·49

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	283·2	...	2·83	...	1825·43
Smyth	289·0	...	2·6	...	1831·85
Smyth	285·7	...	2·6	...	1843·16
Mädler	292·0	...	3·7	...	1858·07
Plummer	291·1	...	2·73	...	1877·31

A *Nautical Almanac* star, in the Whale's mouth, and closely double. A 3, pale yellow; B 7, lucid blue, the colours finely contrasted. With my instrument this beautiful object is certainly not so very difficult to measure; I consider its *fixity* established.

The Arabian astronomers applied the name of *Kaff-al-jidhmà*, the maimed hand, to a group of stars forming the Whale's head; and which, though limited by Ideler to α, δ, λ, μ, and ξ Ceti, has been latterly applied exclusively to γ. There are vestiges showing that the Orientals had a large asterism here in very early times, probably before Cepheus and the Ethiopian plague were thought of.

A line from β Andromedæ through β Arietis, the centre of the three stars in the Ram's head, points nearly upon γ Ceti at about 25° beyond, or as far again; and it is nearly in mid-distance between γ Pegasi and β Orionis.

[Dembowski calls B olive-green; whilst Webb in 1850 marked it "tawny."]

159. 160 P. II. TRIANGULI. (Σ. 300.) CXII.

		h.	m.	s.			s.
			°	′			″
R. A.		2	38	4	Prec.	+	3·53
Decl.	N	28	59·9		——	N	15·46

	Position.		Distance.		Epoch.
	°		″		
Smyth	297·8	...	2·9	...	1831·88
Mädler	299·8	...	3·11	...	1843·62
Talmage	304·3	...	2·71	...	1865·89
Plummer	299·9	...	2·79	...	1877·02

A close double star, very near the wing of Musca, and forming the apex of a nearly equilateral triangle with the two brightest in that insect. A 8, B 8½, both cream-white. This lovely object is in a barren field.

[Gledhill says "probably binary," but the evidence is not very conclusive.]

160. 64 H. I. CETI. (h. 264; H 604; ℜ.) CXIV.

		h.	m.	s.			s.
			°	′			″
R. A.		2	40	35	Prec.	+	2·95
Decl.	S	8	2·3		——	N	15·35

An oval nebula, on the strange pectoral fringe of the Whale's neck, at rather more than a quarter of the distance from ε to *a*. It is pale though distinct, and brightens towards the centre. To insure the identity of so delicate a spot, it needs only be raised a little in the inverted field, when three equidistant stars of the 8th magnitude will appear on the northern verge. There are several very small stars in the field, under a moderate power.

["Very faint in 8½in refractor."—(*Brodie.*) Seen at Parsonstown to have a dark streak on the N. edge.]

161. 48 H. V. FORNACIS. (h. 2495; H. 610.)

		h.	m.	s.			s.
			°	′			″
R.A.		2	41	37	Prec.	+	2·55
Decl.	S	30	43·9		——	N	15·27

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; vm E 151°; v b MN;" which means:—"very bright; large; very much extended in the direction of 151° with the meridian; very much brighter in the middle, indeed there is a nucleus there."

162. η PERSEI. (Σ. 307.) CXV.

R. A.	2h. 42m. 40s.	Prec. +	4s·33
Decl. N	55° 26′·3	—— N	15″·22

	Position.		Distance.		Epoch.
Herschel, W.	290°·1	...	26″·00 ±	...	1779·72
Herschel, J., and South	299·9	...	28·96	...	1821·94
Smyth	300·4	...	28·4	...	1838·78

A fine double star, on the Hero's head, and nearly in mid-distance of a line projected from α Persei, and carried between δ and ε Cassiopeiæ. A 5, orange; B 8½, smalt blue; the colours in clear contrast. A very neat object. There are distinctly 9 stars in the group, of which the principal, as Professor Barlow remarked, having three small stars nearly in a line on one side, and one on the other, forms a miniature representation of Jupiter and his satellites. The leader of this family precedes A a little below the parallel, or N. of it, in the inverted field, with a Δ R.A. = 15^{s}.

This star is 179 P. II., or 9 Hevelius; and was under no small confusion as to its identity in the British Catalogue, until Baily's correctives duly installed it 15 Persei η, No. 348. And he adds: "In the British Catalogue it is stated to be of the 6th magnitude: but in Halley's edition it is called the 4th. On consulting the *original* entry in the MS. book, I find it is there also noted as the 4th; which I have here adopted." It is certainly bright for Piazzi's rating, but I see no reason for altering it, since it is less lustrous than θ or γ Persei, its neighbours of the 4th magnitude.

163. π ARIETIS. (Σ. 311.) CXVI.

R. A.	2h. 43m. 9s.	Prec. +	3s·33
Decl. N	17° 0′·5	—— N	15″·19

		Position.		Distance.		Epoch.
Struve, W.	A B	119°·6	...	3·06	...	1829·89
Smyth	A B	121·6	...	3·1	...	1835·89
	A C	109·9	...	25		
Secchi	A B	121·3	...	2·94	...	1856·77
	A C	110·3	...	24·8	...	1856·55
Gledhill	A B	121·2	...	3·2	...	1870·01

A neat triple star, on the haunch of Aries, closely on the line and about one-third the distance from β Arietis, the middle star of the Ram's head, and Aldebaran. A 5, pale yellow; B 8½, flushed; and C 11, dusky. H. says, the smaller stars are "both mere points," neither of which can be seen "except with considerable and long-continued attention;" but they are comparatively so easy in my instrument, that they may have become brighter. It is remarkable that a MS. remark of H., adduced by his son, describes C as "easier to be perceived" than B. If this was the case in 1782, the object merits watching, for variability.

[Gledhill considers that there is "certain direct motion in AB," but I do not think this is yet established beyond a doubt.]

164. 41 ARIETIS. CXVII.

	h. m. s.		s.
R. A.	2 43 30	Prec. +	3·51
Decl.	N 26° 48′·5	—— N	15″·17

		Position.		Distance.		Epoch.
BURNHAM	A B	265°·8	...	21″·2	...	1879·40
	A C	203·5	...	34·0		
	A D	230·2	...	125·9		

A coarse quadruple star, in the south wing of the Fly, and forming its lucida. A 3, white; B 13, deep blue; C 11, lurid; D 9, pale grey.

Piazzi's note to this star (=186 P. II.) mentions a couple of distant companions—*utraque* 9^{ae} *magnit.*—too far off to be very interesting.

Musca Borealis is a little asterism to the N.E. of the Ram's head, and is known by three stars of the 3rd and 4th magnitudes. It seems to have been composed from *informes* by Bartschius, the scientific son-in-law of Kepler; for which reason, perhaps, it was afterwards retained by Hevelius, though reluctantly. To identify the object here treated, let a line from *a* Boötis be passed under the Pleiades and meet another carried from *a* Andromedæ over *a* Trianguli; it will pass Lucida Muscæ in the mid-distance.

165. *υ* FORNACIS. (*h. 3532.)

	h. m. s.		s.
R. A.	2 44 14	Prec. +	2·39
Decl.	S 37° 52′·2	—— N	15″·13

	Position.		Distance.		Epoch.
HERSCHEL, J.	150°·6	...	8″ *est.*	...	1837·9
STONE, O.	145·6	...	5·3	...	1877·73

A double star. A 6½; B 8.

166. γ^1 FORNACIS. CXVIII.

	h. m. s.		s.
R. A.	2 44 59	Prec. +	2·66
Decl.	S 25° 0′·7	—— N	15″·18

	Position.		Distance.		Epoch.
SMYTH	171°	...	45″	...	1837·94
BURNHAM	157·5	...	49·1	...	1879·95

A star with a delicate companion. A 6, pale white; B 12, light blue.

This object is followed, a little N. of the parallel, Δ R.A. = 25^s, by a star of the 8th magnitude.

This star is close under the Whale's paw, but in the precincts given to *Fornax Chemica* by La Caille. Bode, in altering the type of this asterism, says, "J'ai tracé au lieu de ces instrumens, la délinéation d'une des expériences de l'immortel Lavoisier." A line from *α* Ceti through *η* Eridani, carried a little more than as far again to the S., strikes *γ* Fornacis.

167. 85 B. PERSEI. (Σ. 314.)

	h.	m.	s.			s.
R. A.	2	45	2	Prec.	+	4·19
		°	′			″
Decl.	N	52	32·2	——	N	15·07

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	295·4	...	1·45	...	1830·46
STRUVE, O.	297·0	...	1·71	...	1841·44
MÄDLER	297·9	...	1·56	...	1852·26
SECCHI	300·7	...	1·46	...	1857·62
STRUVE, O.	300·2	...	1·45	...	1872·18

A double star. A 7½, white; B 8, white. Gledhill says, "Probably a binary," but the proof seems to me rather slender.

168. 20 PERSEI. (Σ. 318.) CXIX.

	h.	m.	s.			s.
R. A.	2	46	44	Prec.	+	3·75
		°	′			″
Decl.	N	37	53·5	——	N	15·12

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	236·8	...	14·0	...	1829·14
SMYTH	236·5	...	13·9	...	1832·04
BURNHAM	236·1	...	14·0	...	1878·15

A double star *sp* the *larva*, or mask of Medusa; which may be found by carrying a line from *α* Persei through *β* Persei and about 3° to the S.; and a perpendicular to that point will cut 20 Persei at nearly 1½° to the E. of it. A 6½, pale white; B 10, sky-blue. This is a neat test object. [A itself is double. Pos. 158·7°; Dist. 0.34″; 1878·70.—*Burnham*].

[Closely follows 16 Persei, a star of the 5th mag.]

169. 191 P. II. CEPHEI. (Σ. 320.) CXX.

	h. m. s.		s.
R. A.	2 51 30	Prec. +	7·74
Decl. N	78° 59′·0	—— N	14″·70

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	226·1	...	4·4	...	1831·60
Smyth	225·8	...	5·2	...	1834·91

A double star, with two telescopic companions at a little distance. A 6, orange; B 10½, smalt blue. A charming object discovered by Σ.

This star is in a strange corner of the *f* boundary of Cepheus, but in the part where Le Monnier squeezed in an asterism ("Rangifer") between the Ethiopian monarch and the Cameleopard, to commemorate his operations in Lapland, in 1736. It is about 10° from the Pole-star, on a line leading from thence to β Persei.

[This star is reckoned by B. A. C. and other authorities to be within Cassiopeia.]

170. ϵ ARIETIS. (Σ. 333.) CXXIII.

	h. m. s.		s.
R. A.	2 52 55	Prec. +	3·42
Decl. N	20° 54′·0	—— N	14″ 62

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	186·4	...	0·51	...	1827·61
Smyth	193·5	...	0·5	...	1835·77
Secchi	196·7	...	0·87	...	1856·57
Wilson and Seabroke	200·7	...	1·36	...	1877·09

A very close double star, at the root of the tail. A 5, pale yellow; and B 6½, whitish. When discovered by Σ. he described it as "Inter omnes nostras fortasse vicinissima." And H., writing to me in 1831, asks, "Have you tried ϵ Arietis? My 20ft, with power 480, has fairly separated it. I do not say it will always do so." It must, however, be widening, for I have divorced them myself latterly, though they generally hung in contact at my earlier attempts. [Both angle and distance appear to be slowly increasing.]

ϵ Arietis is readily found, mid-way on a line drawn between the Pleiades and α Arietis; and a ray shot from γ Pegasi between β and γ Arietis, in the Ram's head, and led as far again, strikes ϵ.

[Σ. thought both stars variable.]

171. 220. P. II. PERSEI. (Σ. 331.) CXXII.

	h.	m.	s.			s.
R. A.	2	53	2	Prec.	+	4·24
		°	′			″
Decl.	N	51	54·9	—	N	14·60

	Position.	Distance.	Epoch.
	°	″	
South	85·3	12·9	1823·97
Smyth	84·9	12·4	1835·10
Main	85·0	12·1	1863·08

A neat double star, on the nape of the Hero's neck, slightly preceding a line carried from β Persei to Polaris, at one-third of the distance. A 6, silvery white; B 8, sapphire blue.

172. θ ERIDANI.

	h.	m.	s.			s.
R. A.	2	54	5	Prec.	+	2·28
		°	′			″
Decl.	S	40	44·8	—	N	14·55

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	81·5	8·6	1835·77
Stone, O.	84·4	8·5	1877·83

A double star. A 5; B 6. "One of the stars probably varies to some extent."—(*Gould.*)

173. 104 B. PERSEI. (Σ. 336.)

	h.	m.	s.			s.
R. A.	2	54	44	Prec.	+	3·63
		°	′			″
Decl.	N	31	58·6	—	N	14·50

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	8·5	8·2	1831·17
Mädler	7·2	8·6	1844·95
Secchi	7·2	8·3	1858·03
Struve, O.	7·3	8·8	1868·77

A double star. A 7, yellow; B 8½, blue. Gledhill says:—"Angle unchanged; distance augmented;" but the latter part of this statement seems to me rather premature.

174. α CETI. CXXV.

	h.	m.	s.			s.
R. A.	2	56	31	Prec.	+	3·13
		°	″			″
Decl.	N	3	39·5	—	N	14·39

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	258	29·6	1833·85

A *Nautical Almanac* star, in front of the lower jaw, with a distant companion. A 2½, bright orange; B 10, pale grey. This is a curious object under a moderate power, on account of a decided blue star in the field, N. of it, of the 5½ magnitude.

α Ceti is numbered among the insulated stars, and is called *Menkab*, corrupted from *Al minkhir*, the nose or snout, a name which the Arabians applied, with greater propriety, to λ; but though *rated* of equal magnitude with β Ceti, it is not now so large. A line from Pollux by α Boötis, carried nearly as far again, brings the eye to α Ceti; which star, with α Arietis, forms the lower points of a gigantic W, of which Aldebaran, the Pleiades, and β Persei make the upper portion. The poet says:—

To know the bright star in the Whale, the lower jaw which decks,
From fair Capella send a glance through Pleiad's beauteous specks;
And bear in mind this cluster fine, so admirably seen,
From Cetus' head to th' Charioteer, lies just half-way between.

The figure of this asterism, a veritable *monstrum marinum*, with its long legs, ears, proboscis, missile tongue, and carnivorous jaws, ought rather to have retained the name Ὀρφὸς, Pistrix, as given by Hyginus, than Κῆτος, Cetus.

Lubienietzki, in his *Theatrum Cometicum*, 1667, attempted to lop off some of these redundancies; but in fishifying the animal he has given him so capacious a mouth and throat, that a Munchausen's ship might well have sailed in. Indeed, the leading distinctions of a whale seem to have been overlooked by all the celestial delineators.

Although this *fish*, as shown in Morell's edition of *Aratus*, 1559, is a very queer-looking creature, yet it is better drawn than some later figures, in that it has no legs; but as it is so furnished in the MS. of Cicero's translation of *Aratus* in the British Museum, it is evident that the monster is connected with the tale of Andromeda. Cetus, is, however, the most extensive constellation of the firmament, occupying the large space to the S. under Pisces and Aries; and it was one of the standard old 48 asterisms. Its constituents have been thus numbered:

Ptolemy . . .	22 stars.	Bayer	27 stars.
Copernicus . .	22 ,,	Hevelius . . .	46 ,,
Tycho Brahé . .	21 ,,	Flamsteed . .	97 ,,
Kepler . . .	25 ,,	Bode	301 ,,

The Arabians appear to have given great attention to this fish. From a fancied resemblance of the stars of the head to the *Kaff-al-Khaḍíb* in Cassiopeia, they designated α, δ, λ, μ, and ξ, *Kaff-al-jidhmá*, the maimed hand; the five stars on the body—η, θ, τ, ζ and υ—were *al-na'ámát*, the ostriches; and φ 1, 2, 3, and 4, which are nearly in a straight line across the tail, were called *al-niḍhâm*, the necklace.

175. 52 ARIETIS. (Σ. 346.) CXXVI.

		h.	m.	s.			s.
R. A.		2	58	59	Prec.	+	3·50
		°	′				″
Decl.	N	24	49·5		——	N	14·25

		Position.	Distance.	Epoch.
		°	″	
Smyth	A B	265·7	0·8	1835·88
	A C	355	5	
	A D	85	105	
Dunér	A B	269·5	0·64	1872·26
	A C	357·1	5·14	1872·68
Burnham	A D	82·5	102·8	1880·03

A quadruple group, between the Ram's tail and the Fly, followed nearly on the parallel by a small dusky star. A is 6½, bright white; B 7, pale blue; C 15, blue; and D 13, lilac: the details of the latter two being, of course, mere estimations. It may be picked up by running the eye from 41 Arietis—the lucida of Musca—towards the Pleiades, in which direction it lies, at about one-third of the distance. A line led from γ Pegasi between α and β, in the head of the Ram, and carried nearly as far again, also hits this object.

[Knott thinks C brighter than stated above; brighter in fact than D.]

176. 109 H. I. ERIDANI. (h. 283; H. 645.)

		h.	m.	s.			s.
R. A.		2	59	21	Prec.	+	2·60
		°	′				″
Decl.	S	26	28·7		——	N	14·22

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B: p S; vl E o°; r; S* nr;" which means:—"considerably bright; pretty small; a very little extended in the direction of the meridian; resolveable; there is a small star near."

177. β PERSEI. CXXVII.

		h.	m.	s.			s.
R. A.		3	1	2	Prec.	+	3·88
		°	′				″
Decl.	N	40	31·9		——	N	14·12

	Position.	Distance.	Epoch.
	°	″	
Burnham	192·9	81·8	1880·05

A variable star, with a companion in the *sp* quadrant, and two others [in the *sf*, both of about mag. 12, and both about 1′ from A, according to Burnham.] A 2 to 4, whitish; B [10], purple. This star is generally known as *Algol*, a variation of *Al-ghúl*, the monster or demon; so harshly depicted in Hevelius's map of this asterism. This ominous name was mightily noted in Astrology, and to its influence poor Padre Vitalis, in his dismal Jeremiad, attributed the then unhappy lot of the kingdom of Naples. Sedillot wrote *rhôl* for *ghúl*, but he adopted so singular a mode of expressing Arabic words, that it is not always easy to find out what he meant to denote.

Algol is the most remarkable of the periodic stars, since its changes of light occupy but $2^{d}\ 10\frac{3}{4}^{h}$; and this is best observed at the recurrence of the diminished light, because when brightest it is the more difficult to determine, from its varying in brilliance at different times. The most feeble light lasts about 20^{m}, from the examination of which, Argelander concludes that the period of Algol is not quite constant. The first who observed these variations was Montanari; and in 1694 Maraldi ascertained that it changed from the 2nd to the 4th magnitude.

It varies from the 2nd to the 4th magnitude in $3\frac{1}{2}^{h}$ and back again to the 2nd in the same time, and so remains for the rest of the period, retaining its brightness. [For further particulars see my *Handbook of Astronomy*, 3rd ed., p. 499.]

To find Algol by alignment, project a ray from Orion's belt through *a* Boötis, and carrying it something more than double the distance, it will hit the head of Medusa; or, lisping in numbers,

Thus belt of Hero, eye of Bull, so surely mark the place
Where Algol shines, 'bove three faint stars, in fell Medusa's face.

These same stars collectively, were formerly called the Gorgons.

178. 94 CETI. CXXIX.

R.A.	$3^{\mathrm{h}}\ 7^{\mathrm{m}}\ 9^{\mathrm{s}}$	Prec. +	$3^{\mathrm{s}}\cdot04$
Decl. S	$1^{\circ}\ 36'\cdot5$	—— N	$13''\cdot74$

	Position.		Distance.		Epoch.
SMYTH	260°·0	...	5″·0	...	1836·75
BURNHAM	250·9	...	5·7	...	1877·70

A most delicate double star, on the tip of the cameleon-like tongue with which the celestial Whale is often figured; it will be struck by a line thrown from *a* Arietis, in the Ram's head, through *a* Ceti, and carried about 6½° beyond. A 5½, pale cream-colour; B 16, dusky. Sir J. Herschel registered the acolyte as of the 19th magnitude. But as, after several toilful trials under the best circumstances, I caught a view which, though most evanescent, and under an averted eye, was sufficient to catch a guess by, I have assigned its brightness at the point which is fixed upon as the *minimum visibile* of my telescope. It must, however, be esteemed among the *intensiva* of faintness, and has been repeatedly sought in vain, with the same instrument. This acolyte, if not physically connected with A, must be almost inconceivably beyond it in the vast profundity of those remote regions which may be but the beginning of the Universe.

179. 12 ERIDANI. (*h. 3555.)

		h.	m.	s.			s.
R. A.		**3**	**7**	**23**	Prec.	+	2·52
		°	′				″
Decl.	**S**	**29**	**26·0**		——	N	13·72

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	310·0	5·3	1836·31
JACOB	310·0	3·3	1856·16
STONE, O.	316·0	2·44	1878·81

A very fine double star. A $3\frac{1}{2}$; B 8.

180. 25 H̥. VI. PERSEI. (h. 290; H. 658; ℞.) CXXVIII.

		h.	m.	s.			s.
R. A.		**3**	**7**	**26**	Prec.	+	4·10
		°	′				″
Decl.	**N**	**46**	**49·4**		——	N	13·79

A very extensive and compressed cluster, on the right side of Perseus, in a rich portion of the Galaxy; and it has a gathering spot, about 4′ in diameter, where the star-dust glows among the minute points of light. This elegant sprinkle was registered, in December, 1786, by H̥., who says, "the large stars are arranged in lines like interwoven letters."

[" A low power shows a very faint large cloud of minute stars (H., 12–15 m.) beautifully bordered by a foreshortened pentagon of larger ones." Thus described at Parsonstown Nov. 23, 1848:—"Coarse cluster strongly honeycombed. Would probably look annular with eccentric eyehole if it were far enough to be a nebula."]

181. 362 Σ. CAMELOPARDI.

		h.	m.	s.			s.
R. A.		**3**	**7**	**30**	Prec.	+	4·69
		°	′				″
Decl.	**N**	**59**	**37·8**		——	N	13·71

		Position.	Distance.	Epoch.
		°	″	
STRUVE, W.	A B	142·3	6·9	1831·54
MAIN		141·0	7·2	1863·22
DEMBOWSKI	A C	271·7	35·3	1866·1

A double star. A $8\frac{1}{2}$, very white; B $8\frac{1}{2}$, very white. [C 10.] Other stars near make this a beautiful field.

182.

369 Σ. PERSEI.

		h.	m.	s.			s.
R. A.		**3**	**9**	**9**	Prec.	+	3·88
		°	′				″
Decl.	**N**	**40**	**4·7**		——	N	13·61

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	28·8	3·2	1829·55
Dawes	26·5	3·8	1840·15
Dawes	26·0	3·5	1854·08
Main	25·8	3·6	1864·24

A double star. A 7, yellowish white; B 8, bluish white.

183.

2518 h. ERIDANI. (H. 670.)

		h.	m.	s.			s.
R. A.		**3**	**10**	**46**	Prec.	+	2·19
		°	′				″
Decl.	**S**	**41**	**29·7**		——	N	13·50

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:— "v B; R; gmb M;" which means:—"very bright; round; gradually much brighter in the middle."

184.

487 Dunlop ERIDANI. (h. 2521; H. 685.)

		h.	m.	s.			s.
R. A.		**3**	**13**	**20**	Prec.	+	2·19
		°	′				″
Decl.	**S**	**41**	**30·1**		——	N	13·33

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:— "⊕; v B; p L; R; mb M; er;" which means:—"a globular cluster; very bright; pretty large; round; much brighter in the middle; easily resolveable."

185.

1069 Lac. RETICULI.

		h.	m.	s.			s.
R. A.		**3**	**13**	**27**	Prec.	+	0·95
		°	′				″
Decl.	**S**	**64**	**51·1**		——	N	13·32

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	102·3	19·7	1836·49

A double star. A 7; B $9\frac{1}{2}$. Gould rates B at $8\frac{1}{4}$ mag.

186. 6161 Lal. ERIDANI. (*h. 3565.)

		h.	m.	s.			s.
R. A.		3	13	43	Prec.	+	2·73
		°	′				″
Decl.	S	18	57·6		——	N	13·31

	Position. °	Distance. ″	Epoch.
Herschel, J.	110·4	5·7	1835·78
Stone, O.	111·6	5·9	1876·0

A double star. A 5; B 9. The R.A. given above is believed to be not very accurate. Gould's place gives 3^h 13^m 39^s for 1890.

187. τ^4 ERIDANI. CXXX.

		h.	m.	s.			s.
R. A.		3	14	37	Prec.	+	2·66
		°	′				″
Decl.	S	22	9·5		——	N	13·26

		Position. °	Distance. ″	Epoch.
Smyth	A C	240·8	150	1836·90
Jacob	A B	287·0	5·4	1857·95
Cincinnati Obs.	A B	287·1	4·7	1877·86
Burnham	A C	236·2	159·9	1880·02

A bright star with a [near and a] distant companion, in the second *reach* of the River; being one of no fewer than nine stars designated by the letter τ in Bayer's Map of Eridanus. A 3½, light orange; [B 10; C 11]. This object is in a barren field, and the large star seems overrated, since it appeared more than once diminished to nearly a 5th magnitude; but the lowness of its position renders the case doubtful, from variable refraction. [B was discovered by Capt. Jacob. Burnham mentions 3 other stars at 40″, 123″, and 130″ respectively, all visible he thinks in a 6^{in} refractor.]

188. 37 P. III. PERSEI.

		h.	m.	s.			s.
R. A.		3	15	25	Prec.	+	4·20
		°	″				″
Decl.	N	49	49·1		——	N	13·19

A 6th mag. orange star noted by Webb for having a fine blue companion in a beautiful field. Near α, S. and a little *p* thereof. It is 1035 B.A.C. Persei.

189. α PERSEI. CXXXI.

		h.	m.	s.			s.
R. A.		3	16	28	Prec.	+	4·25
		°	′				″
Decl.	N	49	28·2		——	N	13·13

	Position. °	Distance. ″	Epoch.
Burnham	195·4	165·7	1879·56

A *Nautical Almanac* star, with a companion, in a rich galaxy field.

A 2½, brilliant lilac; B 9, cinereous; they are followed at a little distance by many small stars. [Knott says:—"No trace of Smyth's 9th mag. star. There is a star of that magnitude which precedes *α* by 30″, a little N. of the parallel, and a faint triangle of 14th mag. stars in the *sp* quadrant."] It is now placed in the Hero's left side, but as it was called *Mirfak,* the elbow, or more fully *Al mirfak al thureyyá,* the elbow of the Pleiades, to distinguish it from the other elbow, the figure may have once been differently situated: still its other Oriental name, *Jenb Bersháwush,* signifies the side of Perseus (*Bersháwush* Περσεὺς), the *p* being lost in Arabic. Chrysococca calls it Πλευρὰ Περσάους; and it must be from the word *Jenb* that it was corrupted to Algenib, the style and title of *γ* Pegasi, an equivoque complained of by Sir J. Herschel.

A fancied line projected from the Pole-star to the Pleiades passes through the left knee of Perseus, and points in the mid-distance to Mirfak; which is also gained by a line from Castor to Capella onwards; or by that which the rhymester points out:

A ray from Algol to the Pole with accuracy guide,
Near, but behind it, Mirfak shines in Perseus' manly side.

Perseus, whose mythological story is too well known to require repetition, is one of the old 48 asterisms, and is placed in a very brilliant part of the Via Lactea, nearly opposite to the three stars forming the tail of Ursa Major, on the other side of the pole, and directly N. of the Pleiades. The number of his stars may really be called infinite, on gazing with a powerful telescope; but of his constituents, whose mean apparent places are tabulated, the numbers run:

Ptolemy . . .	29 stars.	Hevelius	46 stars.
Tycho Brahé . .	33 „	Flamsteed . . .	59 „
Bayer	38 „	Bode	196 „

This asterism, in the Arabo-Latin Almagest, is designated *Cheleab,* which Grotius refers to *kelb,* a dog, but others to *kullúb,* the harpago, or hooked weapon in the Hero's hand *.

190. 46 P. III. ARIETIS. (Σ. 381.) CXXXII.

R. A.	**$3^{h}\ 16^{m}\ 59^{s}$**	Prec. +	$3^{s}{\cdot}47$
Decl.	**N $20^{\circ}\ 34'{\cdot}3$**	—— N	$13''{\cdot}02$

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	93·7	...	0·75	...	1827·16
Smyth	87·6	...	0·8	...	1834·19
Struve, O.	91·1	...	0·94	...	1843·71
Hall	90·2	...	0·85	...	1878·10

A close double star, just following the tail of Aries, at about one-third of the distance between δ Arietis and the Pleiades. A 8, pearl white; B 9, yellow. This exquisitely delicate object is in a line with two distant stars of the 10th magnitude in the *sp* quadrant, and there is another small one in the *nf*. The elongation was not immediately detected; and the focus was slightly distorted to examine the outline of the spurious disc. This, if well managed, is often of great use on such occasions.

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* Some of our crusaders must have imported this word; for it is assuredly a better etymon for "club," than the *clwppa* and *kluppel* cited by Dr. Johnson.

191. 106 H. I. ERIDANI. (h. 2523; H. 692; R.)

		h.	m.	s.			s.
R. A.		3	16	59	Prec.	+	2·78
		°	′				″
Decl.	S	15	47·3		——	N	13·09

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; c L; i R; gb M; *7, f $7{\cdot}5^{s}$, 211°;" which means:—"pretty bright; considerably large; irregular round; gradually brighter in the middle; a 7th mag. star follows at $7{\cdot}5^{s}$, at an angle of 211° with the meridian." The bright star precedes, not follows, according to the Parsonstown observations, Jan. 9, 1877. Pos. = 209°; Dist. 244″.

192. 548 Dunlop ERIDANI. (h. 2527; H. 697.)

		h.	m.	s.			s.
R. A.		3	18	28	Prec.	+	2·29
		°	′				″
Decl.	S	37	37·2		——	N	13·00

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; c L; vl E; vsvmb M N;" which means:—"very bright; considerably large; very little extended; very suddenly very much brighter in the middle so as to present a nucleus."

193. 2 (Hev.) CAMELOPARDI. (Σ. 385.)

		h.	m.	s.			s.
R. A.		3	20	8	Prec.	+	4·77
		°	′				″
Decl.	N	59	33·0		——	N	12·89

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	161·3	2·35	1829·94

A double star. A 4½, yellow; B 9½, white.

194. 60 H. I. ERIDANI. (H. 709; R.)

		h.	m.	s.			s.
R. A.		3	20	55	Prec.	+	2·66
		°	′				″
Decl.	S	21	44·2		——	N	12·83

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"v B; S; E 90° ... 180°; smb M N; np of 2;" which means:—"very bright; small; elongated in the direction 90° to 180°; suddenly much brighter in the middle and with a nucleus; this is the north preceding one of 2 nebulæ."

The other nebula is 959 ♅. III, and is "very faint and very small." It follows at 18ˢ and is 26″ to the S.

195. 389 Σ. CAMELOPARDI.

		h. m. s.		s.
R. A.		3 21 18	Prec. +	4·74
		° ′		″
Decl.	N	58 58·9	—— N	12·81

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	61·8	...	2·80	...	1831·00
DAWES	62·7	...	2·82	...	1854·75
GLEDHILL	63·3	...	2·7	...	1873·94

A double star. A 7½, white; B 8½, purplish.

196. 4 (Hev.) CAMELOPARDI. (Σ. 390.)

		h. m. s.		s.
R. A.		3 21 36	Prec. +	4·51
		° ′		″
Decl.	N	55 3·9	—— N	12·79

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	159·6	...	15·0	...	1832·04

A double star. A 5, greenish white; B 10.

197. 88 ♅. VIII. PERSEI. (h. 301; H. 717; ℞.)

		h. m. s.		s.
R. A.		3 24 36	Prec. +	3·85
		° ′		″
Decl.	N	36 56·7	—— N	12·58

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; ab 60 st;" which means:—"a cluster; very large; comprises about 60 stars."

198. 396 Σ. CAMELOPARDI.

		h. m. s.		s.
R. A.		3 24 40	Prec. +	4·72
		° ′		″
Decl.	N	58 23·7	—— N	12·65

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	241·8	...	20·3	...	1829·57
MAIN	241·3	...	20·1	...	1863·80

A double star. A 6½, white; B 8½, white.

199. 401 Σ. TAURI.

		h.	m.	s.		s.
R. A.		3	24	42	Prec. +	3·60
		°	′			″
Decl.	N	27	11·7		—— N	12·58

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	270·0	11·1	1830·96
Main	267·2	11·0	1866·10

A double star. A 7, white; B 7½, white.

200. 400 Σ. CAMELOPARDI.

		h.	m.	s.		s.
R. A.		3	26	20	Prec. +	4·81
		°	′			″
Decl.	N	59	39·6		—— N	12·46

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	282·5	1·52	1829·94
Mädler	288·5	1·08	1845·45
Struve, O.	293·4	1·00	1862·23
Gledhill	295·0	1·2	1873·96
Hall	302·4	0·68	1879·2

A double star. A 7½, yellowish white; B 8½, bluish white. "Certain change in angle and distance. Probably a binary."—(*Gledhill.*)

201. 7 TAURI. (Σ. 412.) CXXXIII.

		h.	m.	s.		s.
R. A.		3	27	55	Prec. +	3·54
		°	′			″
Decl.	N	24	5·7		—— N	12·35

		Position.	Distance.	Epoch.
		°	″	
Herschel, W.	A C	66·7	19·83	1783·77
Struve, W.	A B	269·92	0·69	1830·38
	A C	63·02	22·40	1830·92
Smyth	A B	265·0	0·7	1833·21
	A C	61·9	21·8	
Secchi	A B	256·8	0·42	1856·35
Gledhill	A B	232·0	0·4	1873·94
Wilson and Seabroke	A C	60·6	22·9	1874·00

A triple star, on the back of Taurus, about 3° to the *np* of the Pleiades. A 6, white; B 6½, pale yellow; C 11, bluish. This is a fine and very difficult object. A and C point to a *comes* in the *nf* quadrant. Sir William Herschel did not observe that A was double. It may have opened since.

[It seems certain that A B form a binary, but the relations of C to A B are not by any means clear.]

202. 98 P. III. ERIDANI. (Σ. 422.) CXXXIV.

	h.	m.	s.			s.
R. A.	3	31	8	Prec.	+	3·07
		°	′			″
Decl.	N	0	13·9	——	N	12·20

	Position.		Distance.		Epoch.
	°		″		
SOUTH	225·2	...	5·81	...	1824·02
SMYTH	231·8	...	5·9	...	1834·93
SECCHI	237·3	...	6·37	...	1857·06
BURNHAM	243·2	...	6·4	...	1878·87

A delicate double star, on a line with α Ceti and β Orionis, and nearly one-third the distance: β and α Tauri also point upon it. A 6½, yellow; and B 9, pale blue.

This object is between the Bull's chest and the northern branch of the Eridanus, in the part where the Abbé Hell (who also placed Herschel's telescope among the celestials) squeezed in his *Harpa Georgii*, to compliment a sovereign of these realms; having filched from Eridanus about 30 or 40 stars, some of the 4th magnitude, for the purpose.

[Direct motion certain, but the observations in distance are very contradictory.]

203. 574 Dunlop ERIDANI. (h. 2559; H. 739.)

	h.	m.	s.			s.
R. A.	3	31	18	Prec.	+	2·31
		°	′			″
Decl.	S	35	22·9	——	N	12·12

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; R; psb M;" which means:—"very bright; large; round; pretty suddenly brighter in the middle."

204. 425 Σ. PERSEI.

	h.	m.	s.			s.
R. A.	3	33	9	Prec.	+	3·77
		°	′			″
Decl.	N	33	45·1	——	N	11·99

	Position.		Distance.		Epoch.
	°		″		
SOUTH	103·7	...	3·4	...	1823·98
MÄDLER	103·9	...	3·3	...	1841·79
SECCHI	101·9	...	2·8	...	1857·64
WILSON and SEABROKE	99·3	...	2·61	...	1877·16

A double star. A 8, very white; B 8, very white. Webb writes:—"a true 'pair,' a little *p* 40 Persei, 6th mag."

205. 97 P. III. CAMELOPARDI.

R. A.	$3^{h.}\ 33^{m.}\ 38^{s.}$	Prec. +	$4^{s.}{\cdot}87$
Decl.	N 59° 36′·8	—— N	11″·95

	Position.		Distance.		Epoch.
KNOTT	34°·3	...	55″·6	...	1863·00

A double star. A 6, orange with scarlet glare; B 9, blue.

206. 58 H. I. TAURI. (h. 2566; H. 746.)

R. A.	$3^{h.}\ 33^{m.}\ 42^{s.}$	Prec. +	$2^{s.}{\cdot}60$
Decl.	S 23° 22′·9	—— N	11″·95

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p S; E; psmb M;" which means:—"bright; pretty small; extended; pretty suddenly much brighter in the middle."

Precedes the Pleiades 2°, a little to the S.

207. 34 B. TAURI. (Σ. 427.)

R. A.	$3^{h.}\ 33^{m.}\ 55^{s.}$	Prec. +	$3^{s.}{\cdot}64$
Decl.	N 28° 25′·1	—— N	11″·94

	Position.		Distance.		Epoch.
STRUVE, W.	208°·6	...	6″·7	...	1831·09
DUNÉR	208·6	...	6·6	...	1868·65

A double star. A 7, white; B 8, bluish white. Dunér's colours agree in the main with Struve's.

208. 2569 h. ERIDANI. (H. 748.)

R. A.	$3^{h.}\ 34^{m.}\ 20^{s.}$	Prec. +	$2^{s.}{\cdot}29$
Decl.	S 35° 48′·9	—— N	11″·90

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; p L; psb M; rr;' which means:—"a globular cluster; very bright; pretty large; pretty suddenly brighter in the middle; partially resolved—some stars visible."

209. 39 B. TAURI. (Σ. 430.)

	h.	m.	s.		s.
R. A.	3	34	40	Prec. +	3·16
		°	′		″
Decl.	N	4	46·0	—— N	11·88

		Position.	Distance.	Epoch.
		°	″	
Struve, W.		55·3	26·5	1831·23
Burnham	AB	55·4	26·4	1878·03
	AC	301·0	37·7	

A triple star. A 6, very yellow; B 9½; C 10. A and B at any rate are fixed.

210. 107 H. I. ERIDANI. (h. 2570; H. 752; R.) CXXXVII.

	h.	m.	s.		s.
R. A.	3	35	17	Prec. +	2·70
		°	′		″
Decl.	S	18	54·9	—— N	11·87

A milky-white nebula, between the two northern *reaches* of the River; it is pale, but distinct, round, and bright in the centre. It lies nearly midway between and preceding two distant stars, *sf* and *nf*, the three forming an obtuse-angled triangle; there are only a few glimpse stars besides in the field. To fish it up, run an imaginary line from the coarse double star 40 Eridani through γ, and extend it exactly as far again as the distance between those two points.

["Very faint in $8\frac{1}{2}^{\text{in}}$ refractor."—*Brodie.*]

211. 40 PERSEI. (Σ. 431.) CXXXVI.

	h.	m.	s.		s.
R. A.	3	35	24	Prec. +	3·79
		°	′		″
Decl.	N	33	36·7	—— N	11·83

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	237·0	19·77	1828·15
Smyth	238·2	20·6	1834·92
Smyth	237·8	20·1	1852·12
Burnham	238·0	19·9	1877·88

A delicate double star, on the wing of the Hero's right ankle, if one of the *talaria* may be so called. A 6, pale white; B 10, ash-coloured.

The identity of this star has created some little confusion, since several astronomers, among whom are even Flamsteed and Piazzi, have designated 38 and 40 Persei under the letters o^1 and o^2: but Baily has shown, in his edition of the British Catalogue, that 40 Persei is the "parvula supra *o*" in the *Historia Cœlestis;* and that 38 Persei is the

Greek ’*ο μικρὸν*, while the other is the English *o* of Bayer. It may be found by running a line from *β* Persei a little to the W. of the Pleiades, and it will pass over 40 Persei at something more than half the distance. It is also struck by a ray carried from the cluster in the sword of Orion, over *α* Tauri, and extended a little more than as far again.

212. 19 PLEIADUM. CXXXVIII.

R. A.	3h 38m 39s	Prec. +	3s·55
Decl.	N 24° 7′·4	—— N	11″·61

	Position.		Distance.		Epoch.
MAIN	331°·1	...	64″·6	...	1863·08
BURNHAM	329·8	...	66·7	...	1879·86

A delicate double star, in the cluster on the shoulder of Taurus. A 5, lucid white; and B 10, violet tint. This object, though wide, is fine; being Taygeta, a leading one of the seven sisters, whose name appears to have been of some weight in Sparta. In this group, Celeno and Electra appear to be affected with proper motions, similar in denomination though not in amount: yet they are 10½′ apart, on an angle = 353°.

213. 562 Dunlop ERIDANI. (h. 2581; H. 769.)

R. A.	3h 39m 16s	Prec. +	2s·26
Decl.	S 36° 28′·4	—— N	11″·56

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; pm E; pgb M;" which means:—"a globular cluster; very bright; pretty much extended; pretty gradually brighter in the middle."

214. 15 PLEIADUM. (Σ. 444.) CXXXIX.

R. A.	3h 39m 20s	Prec. +	3s·55
Decl.	N 22° 48′·2	—— N	11″·61

	Position.		Distance.		Epoch.
STRUVE, W.	338°·9	...	3″·27	...	1832·34
SMYTH	342·0	...	5	...	1835·03

A double star, in the cluster on the Bull's shoulder. A 8, bright white; B 14, fine blue.

215.

443 Σ. PERSEI.

	h. m. s.		s.
R. A.	3 39 28	Prec. +	4·01
Decl.	N 41° 8′·6	—— N	11″·54

	Position.	Distance.	Epoch.
Struve, W.	44°·2	9″·0	1830·86

A double star. A 9, white; B 9½, white.

216.

768 H. TAURI.

	h. m. s.		s.
R. A.	3 39 38	Prec. +	3·54
Decl.	N 23° 25′·5	—— N	11″·53

Tempel's variable nebula near the star Merope in the Pleiades. The above place is from Sir J. Herschel's *Catalogue* of 1864. On Oct. 19, 1859, Tempel observed in Taurus an object which he took to be a new telescopic comet. The next evening, however, finding it still in the same position, he was able to determine that it was not a comet, but a nebula. On Dec. 31, 1860, it was seen again by Tempel and Pape, though with some difficulty. Auwers describes it as triangular in form, and 15′ in extent, but he thinks that it might have escaped notice owing to its proximity to a bright star—Merope, one of the Pleiades. Schiaparelli, at Milan, trying a new telescope on Feb. 25, 1875, saw this nebula very clearly, and was much surprised at its size. He noted it to extend from the star Merope, beyond Electra and as far as Celæno.

Maxwell Hall has seen this object well with a 4in refractor in Jamaica. He estimates its dimensions at 45′ by 30′. Tempel only makes it about 35′ by 20′. Schönfeld has doubted the fact of variation. He thinks that this and other nebulæ suspected to be variable being very feeble, large, and diffused, are influenced in their visibility by differences of magnifying power, the varying transparency of the air, and the condition of the observer's eye, so that the aperture of the telescope is a less important factor than it usually is. In spite of the novelty involved in the idea of a nebula being variable, it seems quite clear that several such exist. See my *Handbook of Astronomy*, 3rd ed., p. 543.

217.

23 PLEIADIUM. CXL.

	h. m. s.		s.
R. A.	3 39 48	Prec. +	3·54
Decl.	N 23° 36′·4	—— N	11″·53

	Position.		Distance.		Epoch.
	°		″		
SOUTH	B C 119·7	...	34·5	...	1823·99
BURNHAM	B C 122·4	...	36·7	...	1878·70

A bright star on the Bull's shoulder, pointing to the small pair in the S. of the field. A 5, silvery white; B 8, purple; and C 9, pale blue. This object—Merope—is in a fine neighbourhood, as viewed under a moderate magnifying power, being near the middle of the Pleiades.

[Burnham finds A double. Pos. 11·2°; Dist. 18·1″; 1878·67.]

[In close proximity to this star (optically at any rate) is Tempel's variable nebula (= H. 768).]

218. η TAURI. (Σ. 8 App. I.) CXLII.

	h. m. s.			s.
R. A.	**3 40 56**	Prec.	+	3·55
	° ′			″
Decl. N	**23 45·9**	——	N	11·45

	Position.		Distance.		Epoch.
	°		″		
SOUTH	288·7	...	116·4	...	1824
SMYTH	289·2	...	115·6	...	1836·97
MAIN	288·9	...	118·2	...	1868·82

Alcyone, a *Nautical Almanac* star, with a distant companion, in the midst of the Pleiades, called by the Arabians *Jauza*, the wall-nut, and *Neyyir*, bright, or lucida of the Pleiades. A 3, greenish yellow; B 7, pale white. Piazzi marked this "duplex," but the *comes* could only be 151 P. III.

This star has usually been considered as the one described under the 32nd of Taurus, in Ptolemy, and there marked ε in brightness. But Baily says, "I do not think this star can be η Tauri, on account of its magnitude: yet it is singular that the brightest star in the Pleiades should not have been noticed by Ptolemy *."

The Pleiades constitute a celebrated group of stars, or miniature constellation, on the shoulder of Taurus; their popular influences have been said and sung for many ages. Hesiod mentions them as the Seven Virgins, "of Atlas born;" and in the ancient MS. of Cicero's *Aratus*, in the British Museum, they are finely represented by female heads, inscribed Merope, Alcyone, Celæno, Electra, Taygeta, Asterope, and Maia, under the general title *Athlantides*,—while the illustrations to Julius Firmicus in 1497 represent them as well-grown women. The moral may be, that Atlas himself first rigidly observed these stars, and named them after his daughters. But various are the appellations under which they have been known. Theon likened them to a bunch of grapes; Aratus says they were called ἐπτάποροι; Manilius clusters them as *glomerabile sidus;* the Arabs said they were *Ath-thurayya*, or the little ones; the French designate them *poussinière;* the Germans, *Gluckhenne;* the Italians knew them as *le gallinelle;* the Spaniards term them the *cabrillas*, or little nanny-goats, which is the key of the Duke's query to Sancho; and several *schools* called them the *brood-hen*, under the representation of a hen and chickens. There has also been much discussion as to the number of the individuals in the group, some of the ancients having advanced that there were seven, and others resolving to count only six, in the spirit of Ovid's oft-cited—

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* The occultations of this star, and *h* Pleiadum, by the dark limb of the Moon, were well observed on the 19th March, 1839, by my excellent friend Lord Chief Justice Tindal; who thus elegantly occupied the evening of an assize-day at Bedford.

> Quæ *septem* dici, *sex* tamen esse solent.

The "lost Pleiad" is, however, rather a poetical than an exact expression, for in moonless nights I never had any difficulty in counting seven stars in the so-called Hexastron, with the naked eye; and indeed this is nothing to boast of, for many people may enumerate even more, though few will equal Möstlin, the discoverer of the new star of 1604, who, as Kepler avers, could distinctly see 14 stars in the Pleiades, without any glasses. Still, if we admit the influence of variability at long periods, the seven in number may have occasionally been more distinct; so that while Homer and Attalus speak of six of them, Hipparchus and Aratus may properly mention seven. But they have a singularly brilliant light for their magnitudes, whence the unassisted eye becomes dazzled. The ancients allotted to them only seven stars; but in modern catalogues their numbers have run thus:

Kepler	32 stars.	Hook	78 stars.
Galileo	36 ,,	Jeaurat	103 ,,
De la Hire . . .	64 ,,	F. De Rheita . .	188 ,,

An imaginary line through the wain of the Great Bear, passing α Aurigæ, leads to the Pleiades; or, from the S., a line from Sirius, carried over Orion's belt, meets them.

An interest in the Pleiades is strongly excited by Job's beautiful allusion to God's power, in the 9th chapter of his book. We are held to deal largely in chronology when, by reducing the *occasus matutinus* of these stars—twenty-five days after the autumnal equinox—to this time, we find that [2426] years have elapsed since the death of Thales; but here we have recorded evidence of their being well noticed more than 3000 years ago! Look also to the 38th chapter, where, in convincing Job of ignorance and imbecility, the Omnipotent demands,

> Canst thou bind the sweet influences of the Pleiades, or loose the bands of Orion?
> Canst thou bring forth Mazzaroth in his season? or canst thou guide Arcturus with his sons?
> Knowest thou the ordinances of Heaven? canst thou set the dominion thereof in the earth?

Now this splendid passage, I am assured, is more correctly rendered* thus :—

> Canst thou bind the delightful dainties of Cheemah?
> Or the contractions of Ch'seel canst thou open?
> Canst thou draw forth Mazzaroth in his season?
> Or Ayeesh and his sons canst thou guide?

In this very early description of the cardinal constellations, *Cheemah* denotes Taurus, with the Pleiades; *Ch'seel* is Scorpio; *Mazzaroth* is Sirius, in the "chambers of the south;" and *Ayeesh* the Greater Bear, the Hebrew word signifying a *bier*, which was shaped by the four well-known bright stars, while the three forming the tail were considered as the children attending a funeral. St. Augustin, in his annotations on the above passage, assures us that under the Pleiades and Orion, God comprehends all the rest of the stars, by a figure of speech, putting a part for the whole; and the argument is,—The all-powerful Deity regulates the seasons, and no mortal can intermeddle with them, or presume to scan the ordinances of Heaven.

This beautiful group of stars also attracted very early attention in Greece; and Hesiod, in the opening of the second book of *Works and Days*, has a truly astronomical passage upon the Pleiades, nearly 1000 years B.C. It is thus rendered by Cooke :—

> There is a time when forty days they lie,
> And forty nights, conceal'd from human eye,
> But in the course of the revolving year,
> When the swain sharps the scythe, again appear.

Among the classical ancients the heliacal rising of the Seven Stars was esteemed the most favourable season for setting out on a voyage, though rain and storms were frequently then prevalent, whence Ideler thinks they merit the appellation of *Schiffahrts-gestirn*. Some *savants* tell us, that from the custom of letting fly a pigeon on the occasion, for auspices, they were named the Pleiades, or doves: others say the designation is derived from πλεῖν, to sail; while another class insist that it is derived from πλέος, full, from the genial bearings of the asterism. Thus etymologists dock and stretch words, and limbs of words, after a Procrustean fashion, to suit their own theories, a practice by which they fall into many a trap, even more fatal than that which assumed the Mount Sier of Ezekiel for Monsieur, over-the-way. Of this system of convertible terms and changeable terminations, which form the etymological battery, a notable exposé occurs in Townsend's scourging of Sir W. Drummond; from which we may instance the group in question, *Succoth Benoth*, or

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* On this point see my *Handbook of Astronomy*, 3rd ed. p. 481. The version above is by Drach from Smyth's *Speculum Hartwellianum* as an improvement on what originally appeared in this place in the 1st ed. of the *Cycle*.

Pleiades, on the back of "*Tur*, *Tor*, *Tau*, whence is derived *Turris*, Τορσις, Ταρσος, Τυρσος, Ταυρος, and *Taurus*," the Bull. By the way, Aldebaran was called *Taliyu-n-nejm*, as following or driving the Pleiades: can this have engendered the *tally-ho* of earthly chases? I have elsewhere remarked, what a capital hit a sharp wit might make between *Almack's* famous ball-room, and the beautiful double star *Al'mak*, which being on Andromeda's right foot may be assumed to symbolize dancing.

219. 80 H. VIII. PERSEI. (H. 775; Σ. 446; R.) CXLI.

	h. m. s.		s.
R. A.	3 41 3	Prec. +	4·49
	° ′		″
Decl.	N 52 19·5	—— N	11·48

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	252·7	...	8·54	...	1830·74
Smyth	255·0	...	9·5	...	1836·79

A delicate double star in a cluster over the Hero's left thigh, and about one-third of the distance between γ Persei and Capella. A 8, light yellow; B 11, pale violet. The large individual is placed equatorially between two small stars, and the secondary advances into the *sp* quadrant, forming a fine object.

220. 1237 Lac. DORADÛS. (*h. 3592.)

	h. m. s.		s.
R. A.	3 41 45	Prec. +	1·52
	° ′		″
Decl.	S 54 36·9	—— N	11·37

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	11·3	...	6·0	...	1836·99
Santiago Obs.	6·0	...	6·1	...	1851·93

A double star. A 6, yellow; B 10, pale blue.

221. 30 TAURI. (Σ. 452.)

	h. m. s.		s.
R. A.	3 42 14	Prec. +	3·28
	° ′		″
Decl.	N 10 48·2	—— N	11·34

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	72·7	...	11·27	...	1782·69
Struve, W.	57·9	...	8·89	...	1830·71
Smyth	58·5	...	9·0	...	1839·90

A delicate double star, on the left shoulder-blade of Taurus, indicated by a line drawn from ζ Tauri, in the S. horn, under *a* Tauri, and continued as far again. A 6, pale emerald; B 10, purple.

[Smyth subsequently stated in the *Speculum Hartwellianum* that B was of mag. 9, and the colours not "so decidedly strong as they were 18 years before." He would have entered them as "A, greenish; B, lilac."]

H. has shown, from the existence of some error in H̥'s observations, that "no conclusion respecting the motion or rest of this star can be formed."

222. 27 PLEIADUM. (Σ. 453.) CXLIV.

	h.	m.	s.			s.
R. A.	3	42	37	Prec.	+	3·55
		°	′			″
Decl.	N	23	43·0	——	N	11·32

	Position.	Difference of R. A.	Epoch.
	°	s.	
SMYTH	238·2	11·5	1832·96

A bright star with a distant companion, bringing up the rear of the Pleiades. A 5, intense white; B 9, pale blue. Here the principal star is Atlas, which is marked in Σ.'s Catalogue of 1827 "fortasse cuneus;" I was therefore induced to give it a rigid examination, at various times, under my fullest powers,—but always made the disc perfectly round. On the arrival, therefore, of the Dorpat Catalogue, in 1837, I was not at all surprised to find that in 1836·74, Σ. gazing at this star with a power of 800, records, "Stella simplex in optima nocte." Yet, as the same excellent astronomer had undoubtedly seen it double, with a visible line between the two individuals, it should be closely watched. These were his measures:

Position.	Distance.	Epoch.
°	″	
107·5	0·79	1827·16

[All Mädler's efforts to render certain the duplicity of this star failed. Burnham too has been unsuccessful in all his attempts to detect signs of duplicity; and thinks that Struve fell into some error. But Hartwig at Strassburg, on the occasion of its occultation by the Moon on Jan. 11, 1876, noticed that it did not disappear instantaneously.]

O. Struve, in examining the neighbouring star 165 P. III. (O. Σ. 64), with the refractor of 14·9$^{\text{in}}$ aperture, detected it to be double, the components being of the 8th and 10th magnitudes, and 10″ apart.

223. f ERIDANI.

		h.	m.	s.		s.
R. A.		3	44	33	Prec. +	2·21
		°	'			"
Decl.	S	37	57·8		—— N	11·17

	Position.	Distance.	Epoch.
	°	"	
Herschel, J.	199·7	8·5	1836·52

A double star. A 5; B 5½. Sir J. Herschel calls this object "superb." Gould says that probably the following star of this pair is variable.

224. ζ PERSEI. (Σ. 464.) CXLV.

		h.	m.	s.		s.
R. A.		3	47	13	Prec. +	3·76
		°	'			"
Decl.	N	31	33·4		—— N	10·98

		Position.	Distance.	Epoch.
		°	"	
Smyth	A B	206·6	13·2	1832·19
	A D	198·1	82·9	
	A E	185	121	
Knott	A B	207·5	13·8	1860·80
	A C	290·4	32·8	
	A D	197·0	90·2	
	A E	184·6	122·1	
Burnham	A B	207·2	12·8	1879·58
	A C	286·0	32·5	1879·10

A delicate quadruple star, in the Hero's right foot, and about 7½° N. of and slightly *f* the Pleiades. A 3½, flushed white; B 10, smalt blue; C 11, blue; D 12, ash coloured. This is an elegant group, to which Sir J. Herschel added a fifth star, C, of the 17th magnitude, at 25" distance in the *np* quadrant. [Knott's mags. are, B 10·5; D 10; E 9·8; C 14.] The object gave some trouble, since H.'s register is only for three individuals.

225. 32 ERIDANI. (Σ. 470.) CXLVII.

		h.	m.	s.		s.
R. A.		3	48	46	Prec. +	3·00
		°	'			"
Decl.	S	3	16·8		—— N	10·87

	Position.	Distance.	Epoch.
	°	"	
Herschel, W.	343·4	4·3	1781·81
Struve	349·7	6·7	1825·00
Smyth	346·5	6·6	1843·16
Dunér	347·7	6·6	1870·64
Jedrzejewicz	348·5	6·7	1880·03

A very neat double star, between the chest of Taurus and the River;

and a line carried from γ Eridani to the following part of the Pleiades, passes it at rather better than a quarter of the distance. A 5, topaz yellow; B 7, sea-green [or blue]; the colours in brilliant contrast.

We may conclude that there has been little or no change, though the star is sufficiently easy for the results to have been more coincident.

226. ϵ PERSEI. (Σ. 471.) CXLVIII.

	h. m. s.			s.
R. A.	3 50 28	Prec.	+	4·00
Decl.	N 39° 41′·5	——	N	10″·74

	Position.		Distance.		Epoch.
Herschel, W.	8°·5	...	8″·0	...	1780·59
Smyth	9·1	...	8·4	...	1832·83

A neat double star, under the right knee of Perseus; where it will be struck by a line led from the Pleiades due N. through ζ Persei, and continued a little more than as far again: *i. e.* about 16° in the whole. A 3½, pale white; B 9, lilac. This is a fine and delicate object.

Subsequent observations confirm its fixity. There is a third star in the *sf*, about 90″ distant.

As the components of ϵ Persei were not too faint to bear a trifling loss of light, I successfully employed a method of separating them which was suggested to me by Sir J. Herschel, viz. a central paper disc, of 2in diameter, on the object-glass.

[Webb has several times noted B to be small for its reputed magnitude.]

227. γ¹ ERIDANI. CXLIX.

	h. m. s.			s.
R. A.	3 52 53	Prec.	+	2·79
Decl.	S 13° 49′·3	——	N	10″·56

	Position.		Distance.		Epoch.
Herschel, J.	233°·6	...	45″	...	*not stated.*
Burnham	238·4	...	51·6	...	1878·88

A *Nautical Almanac* star, with a companion, preceding the bunch of τ's with which Bayer's map is disfigured; to be readily identified by shooting a ray from Procyon through the cluster in Orion's sword, and extending it nearly as far again to the E., or by a like process with *a* Aurigæ and the Hyades. A 2½, yellow; B 10, pale grey. It is in the S. part of the upper reach of the River; and there is a third star, of the 11th magnitude, in the *sp* quadrant.

γ^1 Eridani is called Zaurak, from the *Neyyir-al-Zaurak*, or bright star of the boat, of the Arabians: and being at the flexure of the River, as well as large and bright, seems to be the one alluded to by Hipparchus, *Patav. Uranolog.*, as that which the equinoctial colure passed through in the time of Eudoxus. The same colure, however, could not have contemporaneously passed through the right hand of Perseus.

228. 213 P. III. TAURI. (Σ. 479.) CL.

	h. m. s.		s.
R. A.	3 54 22	Prec. +	3·54
	° ′		″
Decl.	N 22 53·4	—— N	10·44

		Position.		Distance.		Epoch.
		°		″		
SMYTH	A B	128·1	...	7·2	...	1835·12
	B C	240·0	...	60		
DUNÉR	A B	128·2	...	7·0	...	1871·17

A delicate triple star, in the neck of the Bull, at about one-third of the distance from the Pleiades towards the Hyades, and slightly to the N. of the line drawn between them. A 7½, white; B 8, grey; C 12, blue.

[3° *f* the Pleiades, a little S. There seem grounds for supposing C to be variable.]

229. 258 H̥. I. HOROLOGII. (H. 793; 𝕽.)

	h. m. s.		s.
R. A.	3 54 47	Prec. +	4·48
	° ′		″
Decl.	S 51 3·9	—— N	10·42

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; S; i F; b M; r; * inv.;" which means:—"very bright; small; irregular figure; brighter in the middle; resolveable; there is a star involved in the nebula."

230. 53 H̥. IV. CAMELOPARDI. (H. 801; 𝕽.) CLI.

	h. m. s.		s.
R. A.	3 57 30	Prec. +	5·10
	° ′		″
Decl.	N 60 37·6	—— N	10·28

A bright planetary nebula, of a bluish white tint, about 60″ in diameter, on the hind flank of the Cameleopard. It is in a rich field of small stars, and was registered by H. as an object whose light was uniform and definition abrupt. It is a curious body.

[Thus described at Parsonstown, Nov. 15, 1873 :—" Exquisite Planetary nebula. Star of mag. 14 in the centre surrounded by faint nebulosity and that again by a bright ring. Many stars in the field (diameter 8′). Diameter of nebula 56″ by 54″."]

[The decl. above is from H.'s *Catalogue* of 1864. Smyth made it less by 5′.]

[" Too faint to be worth looking at in $8\frac{1}{2}^{in}$ refractor."—*Brodie.*]

Closely following the N. vertical of this object, and about ½° from it, is a beautiful and brilliant field of stars, the compact portion of which is 47 H. VII. Many of the components of this group are in pairs, the brightest of which is a neat double star, both of the 7th magnitude, and decidedly red.

231.

485 Σ. CAMELOPARDI.

	h. m. s.		s.
R. A.	3 58 15	Prec. +	5·20
	° ′		″
Decl.	N 62 3·4	—— N	10·16

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	303·3	17·9	1830·24
DUNÉR	303·4	17·8	1871·86

A double star. A 6½, white; B 6½, bluish white. B is, according to Struve, slightly inferior to A in brightness.

232.

179 B. TAURI. (Σ. 495.)

	h. m. s.		s.
R. A.	4 1 27	Prec. +	3·37
	° ′		″
Decl.	N 14 52·0	—— N	9·92

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	216·1	3·6	1830·43
STRUVE, O.	220·5	3·9	1872 9

A double star. A 6½, yellowish white; B 9½, bluish.

233.

60 H. VII. PERSEI. (H. 809; R.) CLII.

	h. m. s.		s.
R. A.	4 1 47	Prec. +	4·40
	° ′		″
Decl.	N 49 12·8	—— N	9·95

A pretty compressed oval group of small stars in the left knee of

Perseus, nearly mid-way between λ and μ, in the space extending from *a* Persei to *a* Aurigæ. It is a well-marked object, with a crown of larger ones around, somewhat in the form of the letter D, and is in a very rich vicinity of splashy groups of stars, one of which to the *nf* is magnificently radiated, and formed like a badge of knighthood. This figure will identify 60 H̶. VII., an object which—however insignificant and dim a blot it may appear—is a myriad of worlds, for a powerful instrument reveals even thousands of stars in it: and various late operations show that we have not yet arrived at our maximum of optical prowess. But J. Harris, F.R.S., tells us, even in 1729, that he does not "think our telescopes will be much farther improved!"

Fig. 6. 60 H̶. VII. Persei.

["Only a ring of small stars visible in $8\frac{1}{2}^{\text{in}}$ refractor. Nothing resembling this sketch."—(*Brodie.*) Seen at Parsonstown to occupy exactly the field of an eye-piece which was 13′ in diameter.]

234. 69 H̶. IV. TAURI. (h. 311; H. 810; R.) CLIII.

R. A.	4h 2m 20s	Prec.	+ 3s·75
Decl.	N 30° 28′·8	——	N 9″·96

A nebulous star over the Bull's neck, about $\frac{1}{4}$th the distance of a line between the *f* portion of the Pleiades and *a* Aurigæ. In the large reflectors this object presents an extraordinary aspect, but with my telescope looks only burred. It was first registered by H̶. in November, 1790, thus:—"A most singular phenomenon; a star 8th magnitude, with a faint luminous atmosphere of a circular form, about 3′ in diameter. The star is perfectly in the centre, and the atmosphere is so diluted, faint, and equal throughout, that there can be no surmise of its consisting of stars, nor can there be a doubt of the evident connection between the atmosphere and the star." From this wonderful aspect H̶. draws the following consequences. Granting the connection between the star and the surrounding nebulosity, if it consist of stars very remote which give the nebulous appearance, the central star, which is visible, must be immensely greater than the rest; or if the central star be no bigger than common, how extremely small and compressed must be those other luminous points which occasion the nebulosity? As, by the former supposition, the luminous central point must far exceed the standard of what we call a star, so, in the latter, the shining matter about the centre will be much too small to come under the same denomination; we therefore either have a central body which is not a star, or a star which is involved in a shining fluid, of a nature totally unknown to us. H. maintained at first, that all nebulæ were stellar masses; but it will be obvious to those who have studied his condensation system, after the palinody of 1791, that he adopted the last opinion on further experience. This luminous matter seems more fit to produce a star by its condensation, than to depend on the star for its existence; but, after all, it may be, that the star happens to fall in a line with the centre of the nebula, so as to be connected optically but not physically. (See 19 H. VI., R.A. 15^h 10^m 57^s, *post.*)

[“No nebulosity visible in 8^{in} refractor.”—(*Brodie.*) On the other hand, described at Parsonstown, Nov. 16, 1873, as “an 8^{th} mag. star in a nebulous atmosphere which is irregular in brightness, being somewhat denser *sf* and somewhat fainter *np.* There is a 16^{th} mag. star about 10″ N. of the N. edge. Diameter from N. to S. 114″.” D'Arrest with a $4\frac{1}{2}^{in}$ refractor found the nebulous atmosphere very conspicuous.]

[Engraved in *Phil. Trans.*, 1833, Pl. ii. Fig. 31; *Phil. Trans.*, 1861, Pl. xxv. Fig. 17.]

235. 510 Σ. ERIDANI.

R. A.	**4** h. **6** m. **30** s.	Prec.	+ 3·08 s.
Decl.	**N 0° 26′·6**	——	N 9″·53

	Position.	Distance.	Epoch.
Struve, W.	300°·5	10″·7	1831·02

A double star. A 7, very yellow; B 10.

236. μ PERSEI. CLIV.

R. A.	**4** h. **6** m. **48** s.	Prec.	+ 4·36 s.
Decl.	**N 48° 7′·7**	——	N 9″·53

		Position.	Distance.	Epoch.
Herschel, J.	A C	231°·2	91″·9	1821·94
Smyth	A C	230·5	92·7	1832·10
Struve, O.	A B	349·2	15·0	1851·10
Burnham	A B	348·6	14·8	1878·15

A star with a distant companion, on the left knee of Perseus, and nearly in mid-distance between *a* Persei and *a* Aurigæ A 4½, greenish yellow; B 12; C 10; some others at a distance in the *sp* quadrant.

237. 61 H̥. VII. PERSEI. (H. 820; Ɍ.)

		h. m. s.		s.
R.A.		4 6 52	Prec. +	4·52
		° ′		″
Decl.	N	50 57·5	—— N	9·50

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; vRi; cC;" which means:—"cluster; bright; very rich; considerably compressed." Webb calls it:—"a good low-power object; larger stars in curves." "The stars have rather a tendency towards a spiral arrangement. 30′ *sf* is a very red star of mag. 9½." (Parsonstown, Oct. 13, 1872.)

238. 39 ERIDANI. (Σ. 516.) CLV.

		h. m. s.		s.
R.A.		4 9 10	Prec. +	2·85
		° ′		″
Decl.	S	10 31·6	—— N	9·32

	Position.	Distance.	Epoch.
	°	″	
SMYTH	154·0	7·1	1832·07
SEABROKE	151·0	6·3	1874·00

A delicate double star, under the *nf* bend of the River, at one-fifth of the line which the eye carries from γ Eridani to γ Orionis, or nearly 6° from the former, where it is so insulated as to be readily identified. A 5, full yellow; B 11, deep blue—and nearly points to an 11th magnitude in the *sf* quadrant.

[*Alias* A Eridani.]

239. 26 H̥. IV. ERIDANI. (h. 2618; H. 826; Ɍ.) CLVI.

		h. m. s.		s.
R.A.		4 9 10	Prec. +	2·79
		° ′		″
Decl.	S	13 1·3	—— N	9·32

A planetary nebula under the *nf* bend of the River, about 4½° from γ Eridani in the direction of β Orionis. A splendid though not very conspicuous object, of a greyish white colour; it is somewhat like a large star out of focus, with a planetary aspect. H̥. remarked that it was slightly elliptical, with an ill-defined disc; and concluded it might probably be a very compressed cluster of stars at an immense distance. The limited aperture of my telescope only permitted the object to appear spherical; but the conjectural disclosure is the same. There are several telescopic

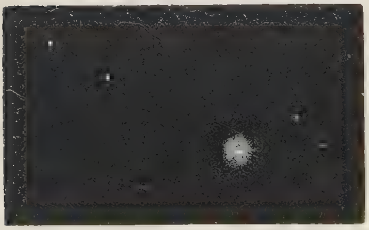

FIG. 7. 26 H̥. IV. ERIDANI.

stars in the field, of which two of the 8th magnitude in the *sp* quadrant point exactly upon it, as in the annexed diagram, where the nebula is shown under its best aspect, highly magnified.

[Lassell describes this as being the most interesting and extraordinary object of the kind which he had ever seen.]

[Engraved in D'Arrest's *Dissertation*, 1861, Pl. ii. Fig. 9; Lassell, *Mem. R.A.S.*, vol. xxiii., Pl. ii. Fig. 4.]

240. 40 ERIDANI. (Σ. 518.) CLVII.

R. A.	**4h 10m 12s**	Prec.	+	2s·90
Decl.	**S 7° 46′·7**	——	N	9″·25

		Position.	Distance.	Epoch.
		°	″	
Smyth	A B	107·6	83·9	1837·09
Struve, O.	A B	105·8	82·3	1874·10
	B C	135·7	4·99	
Burnham	B C	121·8	3·28	1880·09

A very [remarkable ternary] star, in the *nf* reach of the flexous River, designated *Keid*, from the Arabic *al-Kaïḍ*, the egg-shells; being rather better than a degree to the *sf* of *o* Eridani, or *Beïḍ*, the egg, so called from its whiteness, and forming, with the stars around, *Az-ḥa-l-na'ám*, the ostrich's nest. A 5, orange colour; B 9½, sky blue; [C 11]; other stars [2] follow in the field [but do not belong to the system]. This object is remarkable for the great amount of its proper motion. That there is a physical connection between these stars is strikingly shown by the fact that their relative position scarcely changed a second between 1783 and 1837, although the greater individual performed so large a proper movement as nearly 250″ to the S.W. The values of the proper motions assigned to A by Argelander are :—

R. A. −2·19″; Decl. −3·45″.

[*Alias* o^2 Eridani. Many observations concur to show that the distance of A B is diminishing, but the angle seems stationary. It is remarkable that Smyth makes no explicit mention of C, though it was discovered by H. C is endowed with a retrograde motion amounting to about 1° per annum, and the distance is slowly diminishing.]

241. γ TAURI. CLIX.

R. A.	**4h 13m 31s**	Prec.	+	3s·39
Decl.	**N 15° 21′·7**	——	N	9″·00

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	291	17·8	1835·17

A bright star with a distant telescopic companion, in the Bull's nostril. A 3½, fine yellow; B 11, pale blue, preceded by another small star in the *sp* quadrant. This is *Hyadum primus*, or the leader of the Hyades, which, as the name implies, was esteemed a showery group; whence the *pluviasque Hyadas* of Virgil, and the *moist daughters* of Spenser. The family of Atlas was mentioned at η Tauri, but the Hyades were considered to be another batch of his daughters; though some, to lessen his burthen, dubbed them the *Dodonides*, or nurses of Bacchus. The ancients were not agreed as to their number, for while Thales merely reckoned the two eyes, α and ϵ, Euripides counted three, and Hesiod five. Though the identity of this star must be pretty well established, it may be stated, that it lies about one-third of the distance from the Pleiades to the cluster in Orion's sword. But we learn from the poetaster that this direction is almost needless; for—

> Among these gorgeous hosts aloft so gloriously shown,
> The Hyades, and Pleiades, to all who seek are known.

Pliny gives the name Palilicium to the Hyades, while others have made it proper to Aldebaran, because they rose heretofore at Rome, on the feast day of Pales; and Ovid lumps them together as Sidus Hyantis. The group was also called Y-psilon—the Pythagorean symbol of Human life—from its shape; and from thence the Roman V, α and ϵ being the extremes, and γ the angular point. From a notion, either that the same letter resembles a pig's jaws, or that Aldebaran with the Hyades were like a sow with her litter, the Latins designated them *Suculæ*. Cicero, however, thinks the name a corruption, from having mistaken the Greek word *ὕες, pigs*, for *ὕειν, to rain.*

242. φ TAURI. CLVIII.

	h.	m.	s.			s.
R. A.	4	13	34	Prec.	+	3·67
		°	′			″
Decl	N	27	5·4	——	N	9·01

	Position. °		Distance. ″		Epoch.
Herschel, J., and South	240·4	...	56·8	...	1821·95
Smyth	241·8	...	55·9	...	1832·86
Main	243·4	...	52·7	...	1863·08
Dembowski	245·7	...	53·7	...	1873·7

A wide double star, in the upper part of the Bull's neck; within the mid-distance from Aldebaran towards ϵ Persei. A 6, light red; B 8½, cerulean blue.

243. 1419 Lac. ERIDANI. (*h. 3642.)

		h.	m.	s.		s.
R. A.		4	15	13	Prec. +	2·22
		°	′			″
Decl.	S	34	9·1		—— N	8·86

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	157·6	...	5·8	...	1837·90
Stone, O.	160·9	...	7·1	...	1876·05

A double star. A 7; B 10. Near 41 Eridani, a 3rd mag. star.

244. 839 H. TAURI. (K.)

		h.	m.	s.		s.
R. A.		4	15	32	Prec. +	3·49
		°	′			″
Decl.	N	19	15·7		—— N	8·83

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!!; vF; S; variable (Hind);" which means:—"an exceedingly remarkable object; very faint; small; found by Hind to be variable."

On Oct. 11, 1852, Hind discovered, at the Regent's Park Observatory, a small nebula about 1′ in diameter, with a central condensation of light, in the position noted above, and therefore about 1½° distant from ε Tauri.

From 1852 to 1856 a star of the 10th magnitude almost touched the *nf* edge of the nebula; this star was first noticed on the night of the discovery of the nebula, and from the fact that it had escaped observation on many previous occasions when the same locality had been under examination, Hind was induced to suspect its variability—a suspicion which eventually was shown to be well founded, as the star has now dwindled down to the 12th mag. But the most singular thing remains to be told: namely, that on Oct. 3, 1861, D'Arrest of Copenhagen found that the nebula had totally vanished. This statement was not credited at the time, on account of its apparent improbability, notwithstanding the known reputation of the observer who made it; and it was assumed, too hastily, that some error of observation had crept in, though D'Arrest's good faith was not at all questioned.

On Jan. 26, 1862, Le Verrier turned the large Equatorial of the Paris Observatory (of 12·4in aperture) on the place of the nebula; not a single trace, however, could be obtained of it either by Le Verrier or by his assistant, Chacornac, and on the following night Secchi, at Rome, was similarly unsuccessful; thus was confirmed beyond a doubt the statement of D'Arrest. Chacornac, whilst engaged in 1854 in forming a chart of the stars in the neighbourhood of the nebula, saw it, but in going over the locality again in 1858, with a much more powerful instrument, he did not see it, though the reason why he did not announce the disappearance is not stated.

Hence Hind infers that the disappearance of the nebula took place either during 1856 or some time in the course of the following year.

On Dec. 29, 1861, the nebula was again seen in the 15^{in} refractor at Pulkova, and by March 22, 1862, it had so far increased in brightness as to bear a faint illumination. But on Dec. 12, 1863, Hind and Talmage carefully looked for it with the telescope with which it was originally observed, and failed to establish any trace of its visibility. The telescope in question (Mr. Bishop's) has only half the aperture of the one at Pulkova.

Various attempts, but none of them very conclusive, have been made at Parsonstown with Lord Rosse's 6^{ft} Reflector to detect this object. The dates of these attempts were Oct. 11, 1872; Dec. 12, 1876; and Jan. 9, 1877. Other observers, including Dreyer, Copeland, and Tempel, have also recorded negative testimony. O. Struve, however, claims to have seen traces of it from time to time.

I am not aware of any very recent attempts to ascertain whether this nebula continues visible or not.

245. χ TAURI. (Σ. 528.) CLX.

	h. m. s.		s.
R. A.	4 15 53	Prec. +	3·63
	° ′		″
Decl.	N 25 22·2	—— N	8·90

	Position.		Distance.		Epoch.
	°		″		
Smyth	25·1	...	19·3	...	1831·93
Main	24·1	...	19·2	...	1863·05

A neat double star, at the back of the Bull's ear; where with υ it forms what the Arabians termed *Al Kelbeïn*, or the two Dogs. A 6, white; B 8, pale sky-blue. The alignment of χ is not difficult: a ray being shot from α Geminorum through β Tauri, the tip of the Bull's northern horn, and extended about 15° further, towards the Pleiades, strikes upon it: a line from β Orionis through α Tauri, carried half that distance beyond the Bull's eye, also hits it.

246. θ RETICULI.

	h. m. s.		s.
R. A.	4 16 26	Prec. +	0·64
	° ′		″
Decl.	S 63 31·3	—— N	8·74

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	6·1	...	6·4	...	1835·87

A double star. A $5\frac{1}{2}$; B 9. Gould considers A variable to the extent of $\frac{3}{10}$ of a unit of magnitude.

247. 533 Σ. PERSEI.

R. A.	4h. 17m. 15s.	Prec.	+ 3s·87
Decl.	N 34° 3′·8	——	N 8″·69

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	60·2	19·5	1831·25
MAIN	60·5	19·5	1868·82

A double star. A 6½, white; B 8, white.

248. 62 TAURI. (Σ. 534.) CLXI.

R. A.	4h. 17m. 22s.	Prec.	+ 3s·60
Decl.	N 24° 2′·8	——	N 8″·70

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	291·2	28·0	1782·90
SMYTH	290·0	28·6	1835·98
DUNÉR	290·3	28·9	1868·34

A neat double star, on the tip of the Bull's left ear, at rather more than one-third of the distance from the Pleiades to ζ. A 7, silver white; B 8½, purple; and there are several small stars in the field. This is a fair object for a moderate telescope. There seems to have been no appreciable change during an interval of 53 years from 1782 to 1835; though Piazzi's remark—"Duplex. Comes 8^{ae} magnit. præcedit 1·8″ temporis, 10″ circiter ad Boream"—interposes a mystification.

249. 2635 h. DORADUS. (H. 844.)

R. A.	4h. 17m. 32s.	Prec.	+ 1s·33
Decl.	S 55° 12′·2	——	N 8″·67

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; v L; vg, svmb M; 15^{s} d in R.A.;" which means:—"bright; very large; very gradually, then suddenly, very much brighter in the middle; its diameter is 15^{s} of R.A." This may be 338 Dunlop.

250. κ^1 TAURI. (Σ. 9 App. I.)

R. A.	4h. 18m. 38s.	Prec.	+ 3s·55
Decl.	N 22° 2′·5	——	N 8″·58

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	172·6	339	1836·21
MAIN	172·4	339	1866·09
JEDRZEJEWICZ	172·8	339	1879·60

κ^1 and κ^2 form a wide pair as above. The former star is of mag. 5½, and yellowish white; and the latter of mag. 6½, and white. These stars may be connected, but there is no proof of this. The minute pair between κ^1 and κ^2 is Σ. 541 rej., as to which Dembowski gives:—Pos. 324°; Dist. 5·0″; Epoch, 1873·7; mags. 11·2 and 11·6.

251. 1 CAMELOPARDI. (Σ. 550.) CLXII.

R. A.	4h	19m	23s	Prec. +	4s·71
Decl.	N	53°	33′·3	—— N	8″·22

	Position.	Distance.	Epoch.
	°	″	
Piazzi	299·0	12·0	1800·00
Herschel, J., and South	306·5	10·45	1822·05
Smyth	307·9	10·4	1838·09
Dunér	308·2	10·2	1871·38

A neat double star, between the animal's hind hoofs; and nearly in mid-distance between α Persei and δ on the head of Auriga. A 7½, white; B 8½, sapphire blue. The object consists of Piazzi's 83 and 84 of Hora IV.; and though the process of obtaining a position and distance from the observed R.A. and Decl. can hardly be expected to give a result absolutely exact, the Palermo observations merit grave consideration.

252. 548 Σ. TAURI.

R. A.	4h	21m	55s	Prec. +	3s·77
Decl.	N	30°	7″·5	—— N	8″·33

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	35·8	14·1	1831·40
Main	35·6	14·3	1868·82

A double star. A 6½, yellowish; B 8½, bluish.

253. θ^1 TAURI. (Σ. 10 App. I.) CLXIII.

R. A.	4h	22m	16s	Prec. +	3s·41
Decl.	N	15°	43′·1	—— N	8″·30

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	346·2	337·3	1836·13
Main	345·9	337·1	1866·09
Jedrzejewicz	346·4	337·3	1879·16

A wide pair of stars on the Bull's face, where it forms the southern vertex of a small triangle with α Tauri and the Hyades. A 5, pearly white; B, which is θ^2, 5½, yellowish. From an apparent identity in the values and signs of proper motions in space, the components of this object are suspected of being in physical connexion; and imagination is confounded at the probable period of the *annus magnus*, should the idea ultimately prove correct. [Jedrzejewicz, writing in 1880, remarks:—"La suppositon de W. Struve de la conjonction physique de deux étoiles si éloignées se confirme tout à fait."]

Baily thought it probable that Ptolemy observed θ^1 and θ^2 as one star, and of course a *fixed* star.

254. 1464 Lac. SCULPTORIS. (*h. 3650.)

	h. m. s.		s.
R. A.	**4 22 55**	Prec.	+ 2·02
	° ′		″
Decl.	**S 40 46·4**	——	N 8·25

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	184·1	...	4·9	...	1836·91

A double star. A 7; B 9½.

255. 217 ♅. I. AURIGÆ. (h. 315; H. 853; ℟.) CLXIV.

	h. m. s.		s.
R. A.	**4 23 0**	Prec.	+ 3·92
	° ′		″
Decl.	**N 35 1·8**	——	N 8·29

A round pale nebula, between the legs of Perseus and Auriga, of a slight cream-colour. It is so faint that probably I should have overlooked it, but for H. having described its place so exactly, as "inclosed among six stars." Its approach is announced by a star of the 8th magnitude, in the *np* quadrant.

[Brodie thinks the "cream-colour" idea very ridiculous.]

[Engraved in *Phil. Trans.*, 1861, Pl. xxv. Fig. 8.]

256. 80 TAURI. (Σ. 554.) CLXV.

	h. m. s.		s.
R. A.	**4 23 51**	Prec.	+ 3·40
	° ′		″
Decl.	**N 15 23·9**	——	N 8·17

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	12·9	...	1·74	...	1831·18
Smyth	13·9	...	1·6	...	1839·16
Smyth	15·2	...	1·8	...	1843·11
Dawes	10·6	...	1·41	...	1859·15
Wilson and Seabroke	14·7	...	1·29	...	1870·07
Burnham	7·4	...	0·57	...	1879·00

A close double star, on the Bull's face, and about 1½° S.W. of *a* Tauri. A 6, yellow; and B 8½, dusky.

[A small orbital movement seems probable, and a diminution of distance certain, but the observations are remarkably discordant.]

257.

552 Σ. PERSEI.

	h. m. s.		s.
R. A.	4 23 52	Prec. +	4·07
Decl.	N 39° 46′·3	—— N	8″·17

	Position.	Distance.	Epoch.
Struve, W.	114°·4	8″·9	1831·05

A double star. A 6½, very white; B 7, very white.

258.

57 PERSEI.

CLXVI.

	h. m. s.		s.
R. A.	4 25 40	Prec. +	4·19
Decl.	N 42° 49′·7	—— N	8″·10

	Position.	Distance.	Epoch.
Herschel, J., and South	198°·9	110″·1	1821·91
Smyth	199·8	110·3	1833·08
Dembowski	198·9	113·6	1873·7

A wide double star, in the left ancle of Perseus, with several small stars in the field, of which a remarkable one of the 11th magnitude is to the *np* of A, and seems to have escaped the eye of H̥. A and B are both of the 8th magnitude, and white. [Several later observers rate these stars at 6 and 6½, or 6½ and 7, and call them yellow.] Nearly in mid-distance of a line run from α Persei to β Tauri, at about 10° from the former.

259.

559 Σ. TAURI.

	h. m. s.		s.
R. A.	4 27 10	Prec. +	3·46
Decl.	N 17° 47′·0	—— N	7″·91

	Position.	Distance.	Epoch.
Struve, W.	278°·6	3″·0	1830·67
Dawes	278·8	3·06	1840·09
Dawes	276·6	2·78	1854·16
Dunér	278·4	2·73	1871·79

A double star. A 7½, very white; B 7½, very white. Between α and ε Tauri, rather nearer α, and following the line which might join them.

260. 58 PERSEI. CLXVII.

	h.	m.	s.			s.
R. A.	4	29	2	Prec.	+	4·12
		°	′			″
Decl.	N	41	2·3	——	N	7·80

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	B C 29·6	11·71	1828·72
Smyth	B C 29·8	11·8	1843·18

58 Persei, a star on the left heel of Perseus, is an insulated object, assumed as a pointer to the distant pair in the *sf* quadrant [$=\Sigma$. 563], with Δ R.A.$=4^{s}$. A $5\frac{1}{2}$, orange tint; B $7\frac{1}{2}$, greenish; and C 9, lilac. A line led to the N.W. from the preceding star of Orion's belt through γ Orionis and 35° further, strikes upon it; and it precedes the mid-distance of a ray shot from α Persei to β Tauri. The double star is 65 H. III., and there is another couple in the *sp* part of the field, of the 10th and 11th magnitudes, at about the same distance from A as the other pair. The measures of B and C have been very accordant.

261. *α* TAURI. CLXVIII.

	h.	m.	s.			s.
R. A.	4	29	36	Prec.	+	3·43
		°	′			″
Decl.	N	16	17·5	——	N	7·71

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	36·0	109·0	1836·00
Burnham	35·2	113·9	1877·9

A *Nautical Almanac* star, with a telescopic companion, in the southern eye of Taurus. A 1, pale rose-tint; B 12, sky-blue; a magnitude assigned on deliberate comparison, for I was surprised on readily seeing it with my 5^{ft} telescope of $3\frac{3}{4}^{in}$ aperture.

[In consequence of the proper motion of the larger star the distance of AB is increasing. A third star has been added by Burnham with the $18\frac{1}{2}^{in}$ refractor of the Dearborn Observatory. Pos.$=112°$; dist. 30″. Considering that this companion is "exceedingly faint" with $18\frac{1}{2}$ inches of aperture I will say no more about it.]

Aldebaran is readily found by the eye, from being exactly between γ Orionis and the Pleiades. The stars in Orion's belt also point nearly in its direction; and it is moreover easily distinguished by its red colour. The rich appearance of its vicinity has been thus eulogized by the brackish poet:

> In lustrous dignity aloft, see *alpha* Tauri shine,
> The splendid zone he decorates attests the Power Divine:
> For mark around what glitt'ring orbs attract the wandering eye,
> You'll soon confess no other star has such attendants nigh.

Taurus is now the second in the zodiacal march, though *only* 4000 years ago he led the celestial signs, and continued to be their leader for 2000 years. The principal star is *Al-debarán*, the hindmost, because he drives the Pleiades, whence the name of *Stella dominatrix*, and *Táliyu-l-nejm*, were also applied; but it was most popularly known among the Arabians, with whom it was no favourite, as *'aïn-al-thaur*, the bull's eye, though it was placed at a little distance from the animal's head in the ancient configurations. (See No. 241, *ante.*) It is a red star, and I have repeatedly seen it apparently projected on the disc of the moon, even to an amount of nearly 3 seconds of time, at the instant of immersion, when occulted by that body. This phenomenon seems to be owing to the greater proportionate refrangibility of the white lunar light, than that of the red light of the star, elevating her apparent disc at the time and point of contact.

All these suppositions, however, are purely arbitrary, as other stars are liable to a similar affection; and notwithstanding that the call of the Astronomical Society for observations of the occultations of Aldebaran for 1829 and 1830 was zealously responded to from various parts of Europe, nothing satisfactory was elicited. Of 6 observers at the Greenwich Observatory, 5 distinctly saw the projection on the lunar limb; and the majority of corresponding astronomers saw the star either projected or hanging on the moon's edge: but there were several practical men who saw nothing remarkable. The fact, however, of the singular phenomenon is admitted, but subject to much diversity of opinion as to its cause; for it cannot be traced either to the character of the telescope employed, to the observer, or to the weather during the observation. To those who have not the *Memoirs of the Astronomical Society* at hand, an extract from one of my reports may be illustrative:

"October 15th, 1829. I saw Aldebaran approach the bright limb of the Moon very steadily; but, from the haze, no alteration in the redness of its colour was perceptible. It kept the same steady line *to about ¾ of a minute inside the lunar disc*, where it remained, as precisely as I could estimate, two seconds and a quarter, when it suddenly vanished. In this there could be no mistake, because I clearly saw the bright line of the Moon *outside* the star, as did also Dr. Lee, who was with me. The emersion took place without anything remarkable: the dark limb not visible. Telescope 5-foot achromatic, 3¾ aperture, power 78; adjusted on the star." Dr. Lee was watching with a smaller instrument.

H̥. measured the apparent diameter of this *oculus Tauri* as 1·50″; and others have attempted a substantive measurement. Its ruddy aspect has long been noted, and old Leonard Digges, in his *Prognostication Everlasting*, 1555, pronounces that it is "ever a meate rodde." Indeed, all late observers agree in its redness; but Virgil wrote

Candidus auratis aperit quum cornibus annum
Taurus—

which golden horns must rather refer to β and ζ, the two bright stars on the tips, than to the "horns of triumph" of the Scholiast.

To account for this constellation comprising only half the animal, the mythologists have it, that as he personates the bull which swam away with Europa, his flanks are immersed in the billows. This is very much like the Dutch effigies behind a tree; but it does not well explain why Taurus, Pegasus, or Equuleus are deprived of their hinder parts. Ovid, indeed, throws a doubt upon the gender of this sign, by making it the transformation of Io,—but in either case it is still the *munus amoris*, in which the heathens delighted. The classical astronomers are, however, very weak in their mythological derivations and zodiacal origins. In the rare zodiac gold mohurs struck by Jehángír Sháh in 1618, Taurus is represented as a complete though spiritless animal, with the gibbous hump common to Indian oxen: but on the silver rupees of the same monarch, the half animal is drawn in a bold butting attitude, exactly as described by Manilius. Yet Aratus must have seen that of Eudoxus differently placed, for he puts the Pleiades in the knees. Some of the Romans represented the animal as whole; since both Vitruvius and Pliny speak of *cauda Tauri* as being formed by the Pleiades, to the derogation of those young ladies. But the Arabians retained it merely as a section, calling *o*, or Flamsteed's No. 1, the first star in *Al Khaṭ*, the slash, or section.

Taurus is one of the old 48 constellations, and contained the Fourth Mansion of the Moon. It is a very rich asterism, and its components have been thus tabulated:

Ptolemy . . .	44 stars.	Hevelius	51 stars.
Ulugh Beigh . .	43 ,,	Bullialdus . . .	52 ,,
Tycho Brahé . .	43 ,,	Flamsteed . . .	141 ,,
Bayer	48 ,,	Bode	394 ,,

262. 88 TAURI. CLXIX.

R. A.	4h 29m 36s	Prec.	+ 3s·28
Decl.	N 9° 56′·1	——	N 7″·70

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL and SOUTH	299·0	...	69·4	...	1822·88
SMYTH	300·4	...	68·5	...	1832·93
DEMBOWSKI	299·0	...	69·3	...	1874·4

A star with a distant companion, in the right fore-leg of Taurus, being about 6° below α Tauri, where it forms the vertex of an acute-angled triangle with that star and γ Orionis. A 5, bluish white; and

B 8½, cerulean blue. Some minute stars follow A, and there is one of the 9th magnitude in the *np* quadrant.

263. 2 CAMELOPARDI. (Σ. 566.) CLXX.

	h. m. s.		s.
R. A.	4 31 13	Prec. +	4·71
	° ′		″
Decl.	N 53 15·4	—— N	7·60

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	311·7	1·58	1829·79
SMYTH	308·7	1·7	1836·28
JACOB	303·7	1·94	1853·19
WILSON and SEABROKE	294·3	1·54	1875·09

A close double star, between the animal's hind hoofs. A 5½, yellow; B 7½, pale blue. An attentive observer will pick it up by casting a line from Polaris between α Aurigæ and β Persei, leading it about 9° from the former; and it will be intersected by another line, drawn from α Persei to δ in the head of Auriga. Struve recorded it "vicinæ;" but it is certainly wider and easier of measurement than those usually so classed by him. It may, however, be increasing its distance, albeit my observations afford no direct testimony of the fact.

[There is evident retrograde motion, but whether the distance is altering is uncertain.]

264. α DORADÛS. (*h. 3668.)

	h. m. s.		s.
R. A.	4 31 37	Prec. +	1·28
	° ′		″
Decl.	S 55 16·4	—— N	7·54

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	108·5	82·3	1836·01

A star with a distant companion. A 3; B 11.

265. 4 B. AURIGÆ. (Σ. 572.)

	h. m. s.		s.
R. A.	4 31 41	Prec. +	3·69
	° ′		″
Decl.	N 26 43·7	—— N	7·53

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	210·3	3·1	1830·56
DUNÉR	204·6	3·4	1871·63
JEDRZEJEWICS	204·7	3·7	1880·20

A double star. A 7, yellowish; B 7, yellowish.

266. 1551 Lac. RETICULI. (*h. 3670.)

	h.	m.	s.			s.
R. A.	4	32	27	Prec.	+	0·62
		°	′			″
Decl.	S	63	3·1	——	N	7·48

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	95·6	...	30 *est.*	...	1836·92

A double star. A 6½, yellow; B 8½, pale blue.

267. σ^1 TAURI. (Σ. 11 App. I.)

	h.	m.	s.			s.
R. A.	4	32	52	Prec.	+	3·41
		°	′			″
Decl.	N	15	35·0	——	N	7·44

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	192·3	...	427	...	1836·22
Main	192·4	...	429·8	...	1871·22
Jedrzejewicz	192·6	...	429·2	...	1879·32

σ^1 with σ^2 form a wide pair; the former is of mag. 5½ and the latter 6, both white. Struve having thought fit to catalogue them I have done the same, especially after Webb's remark that they "look like a connected system." But I am not acquainted with any evidence to show this.

268. 576 Σ. ERIDANI.

	h.	m.	s.			s.
R. A.	4	32	53	Prec.	+	2·78
		°	′			″
Decl.	S	13	14·4	——	N	7·46

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	172·0	...	12·3	...	1830·83
Stone, O.	171·4	...	12·1	...	1878·86

A double star. A 7, yellowish white; B 8, yellowish white. A little *nf* 53 Eridani, a 4th mag. star.

269. τ TAURI. CLXXI.

	h.	m.	s.			s.
R. A.	4	35	38	Prec.	+	3·59
		°	′			″
Decl.	N	22	44·8	——	N	7·20

	Position.		Distance.		Epoch.
	°		″		
South	211·5	...	62·8	...	1824·00
Smyth	209·8	...	61·6	...	1831·96
Main	210·5	...	63·3	...	1862·02

A star with a companion, in a barren field, at the root of the Bull's left horn; and about 6° N. of α Tauri, on a line leading from that star to α Aurigæ. A 5, bluish white, and B 8, lilac.

The fixity of these stars may be held to be established.

270. 122 ♅. I. ERIDANI. (h. 327; H. 888; R.)

		h.	m.	s.			s.
R. A.		4	35	57	Prec.	+	3·00
		°	′				″
Decl.	S	3	5·3		——	N	7·18

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; R; vgb M; er;" which means:—"considerably bright; large; round; very gradually brighter in the middle; easily resolveable." About 1° *nf* μ Eridani, a star of mag. 5. Several times suspected at Parsonstown to be spiral. Dreyer remarks that this object is not noted as "easily resolveable" by anybody except Sir J. Herschel. Engraved, *Phil. Trans.*, 1861, Pl. xxv. Fig. 9.

271. 55 ERIDANI. (Σ. 590.) CLXXII.

		h.	m.	s.			s.
R. A.		4	38	18	Prec.	+	2·87
		°	′				″
Decl.	S	8	59·9		——	N	7·0

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	314·1	...	9·16	...	1783·08
SMYTH	318·5	...	10·2	...	1832·12
MAIN	316·7	...	9·0	...	1862·05

A neat double star, under the *nf* extreme of the River, and close to the four vertical stars of the 4th magnitude, which Kirch classed in 1688 as *Sceptrum Brandenburgicum:* and which was revived a century afterwards by Bode. A and B are both 7½, and yellowish white.

This object may be found by the out-of-door observer by running a line from β Geminorum through α Orionis, and leading it rather more than half as far again into the S.W., where it forms the vertex of an isosceles triangle, the base of which is formed by β Orionis and β Eridani.

272. 1583 Lac. RETICULI. (*h. 3683.)

		h.	m.	s.			s.
R. A.		4	38	29	Prec.	+	0·96
		°	′				″
Decl.	S	59	10·1		——	N	6·98

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	81·2	...	3·8	...	1836·45

A double star. A 8; B 8.

273. 2666 h. SCULPTORIS. (H. 916.)

		h.	m.	s.			s.
R. A.		4	45	47	Prec.	+	2·27
		°	′				″
Decl.	S	32	9·5		——	N	6·39

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"v B; L; i R; 4 st inv;" which means:—"very bright; large; of an irregular round outline; 4 stars involved."

274. 7 CAMELOPARDI. (Σ. 610.) CLXXIII.

	h. m. s.		s.
R. A.	4 48 26	Prec.	+ 4·77
Decl.	N 53° 34′·4	——	N 6″·20

	Position.		Distance.		Epoch.
Struve, W.	A C 238°·3	...	25″·6	...	1831·57
Smyth	A C 239·2	...	27·0	...	1838·71
Brodie	A C 239·1	...	27·3	...	1865 ±
Dembowski	A B 308·8	...	1·2	...	1864

A delicate and difficult triple star, on the animal's hind hoof; and about two-thirds of the distance from *a* Persei towards δ in the head of Auriga. A 4, white; B 8; C 11. A and C point to a 4th star in the *sp* quadrant, of the 12th magnitude.

[B was discovered by Dembowski in 1864.]

Camelopardus is a large but indifferent constellation of recent formation, occupying the vast *sporadic* space between the Pole-star, Perseus, and Auriga. It was introduced by Bartschius, on his 4ft globe, and is said to have been reluctantly retained by Hevelius; who, though he did prefer plain to telescopic sights, yielded only to Flamsteed in diligence and accuracy of observation, among the astronomers of his day: at all events the Cameleopard is not among the new constellations which Hevelius is offering to Urania and her choice staff, in the elaborate frontispiece to his *Atlas*. The animal is fairly delineated in his map, although its very existence was, even after that epoch, questioned. He assigned it 32 stars, which Flamsteed increased to 58, and Bode to 211.

275. ι PICTORIS.

	h. m. s.		s.
R. A.	4 48 28	Prec.	+ 1·34
Decl.	S 53° 39′·0	——	N 6″·16

	Position.		Distance.		Epoch.
Herschel, J.	57°·9	...	12″·3	...	1834·97

A double star. A 5½; B 6½.

276. 62 ERIDANI. CLXXV.

	h. m. s.		s.
R. A.	4 50 59	Prec. +	2·95
Decl.	S 5° 20′·8	—— N	6″·00

	Position. °	Distance. ″	Epoch.
Herschel, J., and South	74·7	65·8	1821·97
Smyth	73·6	63·8	1831·93

A wide double star, in the centre of the *nf* end of the River. A 6, white; B 8, lilac; a third star in the *np*, of the 10th magnitude, makes A the apex of a scalene triangle. An imaginary line led from δ Orionis, the third star in Orion's belt, close over β Eridani, touches 62, at about 3° W. of the said β.

[2½° preceding β.]

277. ω AURIGÆ. (Σ. 616.) CLXXIV.

	h. m. s.		s.
R. A.	4 51 47	Prec. +	4·05
Decl.	N 37° 43′·4	—— N	5″·90

	Position. °	Distance. ″	Epoch.
Herschel, J., and South	352·0	7·89	1822·90
Smyth	352·6	7·0	1833·88
Main	350·0	5·9	1863·12

A neat double star, preceding the hip of Auriga; and about one-third down a line passed from α Aurigæ to the Hyades. A 4, pale red; B 8, light blue. Though this fine object is well defined, from the disparity of size in the pair it is not at all of the easiest measurement: yet there are few double stars of which the results are more coincident. The star *nf* this object, 5 Aurigæ [=O. Σ. 92], has been found to be a most delicate double star by O. Struve, the components being 6th and 10th magnitudes, and 2·8″ apart: it should be remarked, however, that the acolyte is Σ.'s "10th," which in some cases cannot be estimated at less than my 15th.

278. 258 P. IV. ORIONIS. (Σ. 622.) CLXXVI.

	h. m. s.		s.
R. A.	4 52 23	Prec. +	3·10
Decl.	N 1° 30′·3	—— N	5″·85

	Position. °	Distance. ″	Epoch. ″
Struve, W.	179·9	2·64	1832·09
Smyth	180·4	2·4	1833·92
Secchi	176·4	2·41	1858·08
Gledhill	173·2	2·7	1876·07

A fine double star, just preceding Orion's right knee; and at rather more than a third of the distance from β Orionis to α Tauri, where it is intersected by a line passed from β Geminorum through γ Orionis. A 8½, white; B 9, pale grey.

[Probably moving.]

279. 257 P. IV. TAURI. CLXXVII.

	h. m. s.		s.
R. A.	**4 52 44**	Prec. +	3·39
	° ′		″
Decl.	**N 14 22·5**	—— N	5·80

		Position.		Distance.		Epoch.
		°		″		
South	A B	304·4	...	38·4	...	1822·09
Main	A B	304·1	...	40·5	...	1863·05
Burnham	A B	304·4	...	39·0	...	1880·06
	A C	88·3	...	54·2		

A wide triple star, between the Bull's ear and Orion's arm; and nearly one-third of the distance from α Tauri towards α Orionis, where it is also shown by a line carried from Sirius through γ Orionis, and extended about 10° beyond. A 7, white; B (which is No. 255 of Piazzi) 8, cerulean blue; and C 10, purple, with a minute star following it. This is a pretty though coarse object, forming a neat arc.

[*Alias* 26 B. Orionis.]

280. 28 B. AURIGÆ. (Σ. 623.)

	h. m. s.		s.
R. A.	**4 53 2**	Prec. +	3·72
	° ′		″
Decl.	**N 27 9·9**	—— N	5·78

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	205·1	...	20·4	...	1829·90

A double star. A 7½, very white; B 9, white.

281. R. LEPORIS.

	h. m. s.		s.
R. A.	**4 54 36**	Prec. +	2·73
	° ′		″
Decl.	**S 14 58·2**	—— N	5·64

Hind's celebrated "crimson" star. Variable from mag. 6 to 9 with a period of 438^{d}. The colour was first remarked by Hind in 1845, and the variability by Schmidt in 1855. Hind's account runs as follows:—"Of the most intense crimson, resembling a blood-drop on the black ground of the sky; as regards depth of colour, no other star visible in these latitudes could be compared to it." Schmidt in 1855 considered it to be gaining light and losing colour, but in Jan. 1876 and again in Jan. 1880 I saw it as deep a ruby as well could be, and quite deserving all the encomiums passed upon it. Schönfeld's description is "Intensiv blutroth."

282.

627 Σ. ORIONIS.

		h.	m.	s.			s.
R. A.		4	54	47	Prec.	+	3·15
		°	′				″
Decl.	N	3	26·8		——	N	5·63

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	260·2	21·3	1831·51
MAIN	258·8	20·8	1866·16

A double star. A $6\frac{1}{2}$, white; B $7\frac{1}{2}$, bluish.

283. 167 Dunlop DORADÛS. (h. 2706; H. 976.)

		h.	m.	s.			s.
R. A.		4	55	56	Prec.	+	0·26
		°	′				″
Decl.	S	65	23·0		——	N	5·54

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; R; gb M; f of 2;" which means:—"very bright; pretty large; round; gradually brighter in the middle; the following one of 2 nebulæ."

284. 278 P. IV. ORIONIS. CLXXVIII.

		h.	m.	s.			s.
R. A.		4	56	18	Prec.	+	3·10
		°	′				″
Decl.	N	1	26·8		——	N	5·50

	Position.	Distance.	Epoch.
	°	″	
SOUTH	48·3	14·4	1824·97
SMYTH	49·3	13·7	1833·92
MAIN	49·0	13·8	1863·06

A neat double star, on Orion's right knee. A $8\frac{1}{2}$, silvery white B 9, pale blue. He who has no equatorial instrument may fish up this object by carrying an imaginary line from Sirius over the cluster in Orion's sword, and about 10° beyond: or it may be sought near the mid-distance between Aldebaran and α Leporis.

[1° *f* π^6 Orionis, a star of the 5th mag.]

285. 2711 h. DORADÛS. (H. 982.)

		h.	m.	s.			s.
R. A.		4	56	35	Prec.	+	0·10
		°	′				″
Decl.	S	66	35·0		——	N	5·48

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; vim E;" which means:—"very bright; very large; very irregularly but much extended." Engraved, *Cape Obs.*, Pl. iii. Fig. 3.

286. 96 Birm. ORIONIS.

	h. m. s.		s.
R. A.	4 59 43	Prec. +	3·09
	° ′		″
Decl.	N 1 1·6	—— N	5·21

A red star noted by Lalande as "rouge," 7; Bessel, "roth," 7; Birmingham, 1871, "fine red," 6; Birmingham, 1876, "splendid red," 7; Webb, 1874, "pale ruby," 8.

287. 61 H. VIII. AURIGAE. (h. 344; H. 996.) CLXXX.

	h. m. s.		s.
R. A.	5 0 33	Prec. +	4·04
	° ′		″
Decl.	N 37 12·8	—— N	5·19

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	219·2	1·61	1828·60
SMYTH	220·6	1·8	1832·25
MÄDLER	224·1	1·64	1852·18
DOBERCK	221·1	1·71	1878·08

A loose cluster, on the lower garment of Auriga; where a line from α Orionis passed over the stars ζ and β Tauri, the tips of the Bull's horns, hits it at 10° beyond. This object is a bright though freely spread band of stars, from 8th to 13th magnitudes, having 4 brighter ones in a curve, of which the leader is double; and there are 3 other pairs. Just to the N. of the parallel it is followed by the beautiful double star Σ. 644, (A 7, topaz; B 8, amethyst), which, from its aspect, being more likely to prove an optical object than the rest, was carefully measured, as above.

[The measurements of the double star are very contradictory, and I can hardly concur in Gledhill's view that they imply "probable change in the angle."]

[Webb gives the colours as "golden; reddish blue," and says they are remarkable and constant.]

["Rich field, but hardly a 'cluster.'"—*Brodie.*]

288. 66 ERIDANI. (Σ. 642 rej.) CLXXXII.

	h. m. s.		s.
R. A.	5 1 19	Prec. +	2·96
	° ′		″
Decl.	S 4 48·2	—— N	5·08

	Position.	Distance.	Epoch.
	°	″	
SMYTH	13·8	47	1832·01
BURNHAM	9·4	52·7	1880·00

A coarse double star, close to the shin of Orion, where it will be seen closely preceding and N. of β Eridani. A 6, white; and B 11, lilac;

these two nearly pointing upon a third small star, near the S. vertical; and there are other stars in the field. It appears on the Dorpat *Catalogue* as 642, but without measures or description: and in the edition of 1837 has the "*rej.*" against it.

289. 295 P. IV. TAURI. CLXXXI.

R. A. 5h 1m 24s | Prec. + 3·64s
Decl. N 24° 7′·2 | —— N 5·07″

	Position.		Distance.		Epoch.
	°		″		
SMYTH	195·5	...	28·0	...	1831·94
BURNHAM	197·0	...	35·0	...	1878·98

A double star, between the horns of Taurus; where a line from Sirius passed close to the W. of α Orionis, and led nearly as far again, will find it, lying between α and β Tauri. A 6, pearly white; B [9], pale blue.

Edgeworth in 1878 found a minute star nearer than B. Of this Burnham gives:—Pos. 148°; Dist. 12·9″; Epoch, 1878·98; mag. 12½.

290. 531 Dunlop (?) SCULPTORIS. (h. 2730; H. 1009.)

R. A. 5h 1m 25s | Prec. + 2·05s
Decl. S 38° 9′·0 | —— N 5·07″

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; m E 314°; gl b M; rr;" "which means:—"very bright; very large; much extended in the direction of 314° with the meridian; gradually less bright in the middle; partially resolved—some stars visible."

291. β ERIDANI. CLXXXIII.

R. A. 5h 2m 26s | Prec. + 2·95s
Decl. S 5° 13′·7 | —— N 4·98″

	Position.		Distance.		Epoch.
	°		″		
SMYTH	147·5	...	120	...	1830·98
BURNHAM	143·3	...	116·7	...	1880·80

A bright star with a distant telescopic companion, on the shin-bone of Orion. A 3, topaz yellow; B 12, pale blue. I examined this object with anxious care, because in Σ.'s first *Catalogue*, No. 647, A is marked "vicinæ;" and he moreover considered it to be formed of two close stars of the 7th magnitude. All my endeavours, however, could only raise a round disc, and Σ. has since declared it "simplex."

[Possibly variable to the extent of ½ a unit, according to Gould.]

This star is readily found from its vicinity to Rigel, being just above it, and in the direction of the Hyades; the poetaster of these matters tells us:

> Where Rigel shows the Hero's foot, north-westerly—not far—
> Against his leg in glory shines the River's second star.

Many writers think this River, which, according to Sherburne, flows over the meridian at midnight in November, was originally intended to typify the Nile, and that the vanity of the Greeks led them to call it Eridanus. By other sage authorities we gather that the river represents either the Spartan *Fluviorum rex*, or the Po, or the Granicus, or Orion's river, or some other stream; while Ptolemy merely terms it the Ποταμοῦ ἀστερισμὸς, or *asterism of the river*, which is followed in the *Fluvius* of the Latins. In the early wood-cut figures of illustrations to Hyginus, Eridanus is represented as a reclining female; while in the MS. of Cicero's *Aratus* it is delineated as a river-god, with his urn and aquatic plant. At all events it is one of the old 48 constellations, and its members have been thus successively enumerated:

Ptolemy . . .	34 stars.	Bayer	42 stars.
Copernicus . .	34 „	Bullialdus . . .	39 „
Tycho Brahé . .	19 „	Flamsteed . . .	84 „
Kepler	39 „	Bode	343 „

This star is called Cursa, from the Arabic *al-kursá*, a chair or throne, and is the principal individual of the asterism seen in this hemisphere; *α* being far down in the S., though not quite at the end of the River, *ultima Fluvii*, as its name *Achernar* implies, it being from *ákher-nahr*, the latter part.

292. 47 B. AURIGÆ. (Σ. 645.)

R. A.	5h. 2m. 50s.	Prec. + 3s.75
Decl.	N 27° 53′·1	—— N 4″·95

	Position.	Distance.	Epoch.
Struve, W.	26°·8	11″·7	1829·90
Main	26·6	12·1	1864·30

A double star. A 6½, white; B 9, ashy.

293. 236 Dunlop DORADUS. (h. 2749; H. 1031.)

R. A.	5h. 4m. 4s.	Prec. + 0s.07
Decl.	S 66° 34′·6	—— N 4″·85

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"⊕; vB; pL; R; vmC; rr;" which means:—"a globular cluster; very bright; pretty large; round; very much condensed; partially resolved—some stars visible."

294. 269 P. IV. CAMELOPARDI. (Σ. 634.) CLXXIX.

	h. m. s.			s.
R. A.	5 4 26	Prec.	+	9·75
	° ′			″
Decl.	N 79 6·1	——	N	4·81

	Position.		Distance.		Epoch.
	°		″		
South	346·4	...	37·0	...	1825·10
Struve, W.	348·9	...	34·0	...	1834·15
Smyth	349·1	...	33·8	...	1836·25
Dembowski	353·1	...	26·2	...	1858·33
Wilson and Seabroke	360·1	...	21·3	...	1875·09
Jedrzejewicz	2·1	...	20·2	...	1878·32

A fine double star, at the lower part of the back of the animal's neck. A 5½, light yellow; and B 9, pale blue; while in the *np* quadrant, about 2′ distant, is the little star mentioned by Piazzi, "2′ ad Boream, 2″ temporis præcedit, alia 10ᵃᵉ magn." This object is 19 Hev. Camelopardi.

[The above changes are partly due to proper motion, and it is an open question whether they are not wholly so due. O. Σ. thinks that 10 or 20 years will decide the point.—*Bull. de l'Acad. St. Pet.*, vol. xix.]

To find this object look about 10° on a line carried from Polaris between α and β Aurigæ: a line from β Draconis carried through the Pole-star also reaches it at the same distance beyond.

295. 4 Ḩ. VII. TAURI. (h. 349; H. 1030; R.) CLXXXIV

	h. m. s.			s.
R. A.	5 5 42	Prec.	+	3·45
	° ′			″
Decl.	N 16 34·1	——	N	4·68

	Position.		Distance.		Epoch.
	°		″		
Smyth	60·7	...	25·0	...	1837·73
Burnham	60·1	...	19·9	...	1880·07

A very delicate double star preceding a tolerably condensed cluster, over the right arm of Orion. A 8, yellow; B 11, bluish. This object is an outlier of a rich gathering of small stars, which more than fills the field; it was registered by Ḩ. under an estimation of 20′ or 25′ of diameter, but he did not notice the pair. However, Sir J. Herschel thus describes it: "Large rich cluster; stars 12 to 15 m.; fills field. Place that of a D *. The most compressed part is 42·5ˢ foll. the D *, and 3′

south of it." Described by D'Arrest as "Ein ausserordentlich reicher Hauf"—an extraordinarily rich cluster.

The whole may be fished up by carrying a line from δ Orionis the foremost star in Orion's belt, through γ Orionis, and there intersecting it by another from α Tauri, due E. towards γ Geminorum.

296. 652 Σ. ORIONIS.

		h.	m.	s.			s.
R. A.		5	6	5	Prec.	+	3·09
		°	′				″
Decl.	N	0	53·8		——	N	4·67

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	184·3	1·71	1830·18

A double star. A $6\frac{1}{2}$, yellowish; B $8\frac{1}{2}$, white.

297. ι LEPORIS. (Σ. 655.) CLXXXV.

		h.	m.	s.			s.
R. A.		5	7	10	Prec.	+	2·79
		°	′				″
Decl.	S	12	0·0		——	N	4·59

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	359·5	12·3	1782·69
Struve, W.	337·6	12·8	1832·25
Morton	335·4	13·4	1856·08
Burnham	337·3	12·2	1879·14

A fine and delicate double star, in the Hare's left ear; where a line from α Orionis through ε—the middle star of the belt—and extended rather more than as far again into the S.W., will pick it up. A $4\frac{1}{2}$, white; B 12, pale violet, with a reddish distant star nearly N. Little of a decided character can be deduced from the observations of so difficult a star.

[The observations are still very discordant; even those of recent years, what few there are.]

298. ρ^1 ORIONIS. (Σ. 654.) CLXXXVII.

		h.	m.	s.			s.
R. A.		5	7	32	Prec.	+	3·13
		°	′				″
Decl.	N	2	43·7		——	N	4·55

	Position.	Distance.	Epoch.
	°	″	
South	62·0	7·05	1825·12
Struve, W.	63·5	7·05	1832·05
Smyth	61·8	6·8	1835·89
Seabroke	63·3	7·1	1874·09

A pretty double star, between the right arm and thigh of Orion; in a line with the stars of the belt, preceding it by exactly double its length. A 5, orange; B [9], smalt blue—the tints are so decided as to bear out Σ.'s remark, "colores insignes." There has been no appreciable change in 50 years. There are several other small stars in the field, of which two bright ones in the *sp* quadrant form a coarse pair, at an ∠ from A = 240°, with Δ R. A. = 29^s. A natural index for the future detection of proper motions in the star ρ, is offered us in its just preceding and being nearly equidistant between two small stars, the one N. and the other S. of it.

299. κ LEPORIS. (Σ. 661.) CLXXXIX.

	h.	m.	s.				s.
R. A.	**5**	**8**	**9**	Prec.	+		2·77
		°	′				″
Decl.	**S**	**13**	**4·2**	——		N	4·50

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	358·6	...	3·05	...	1832·23
SMYTH	359·5	...	3·7	...	1835·02
WROTTESLEY	359·5	...	3·2	...	1857·90
MAIN	3·6	...	2·16	...	1862·05
STONE, O.	357·6	...	2·46	...	1877·95

A close double star, at the root of the animal's left ear, and which may be readily fished up about 5° S. of β Orionis, on a line run from γ Orionis through the latter. A 5, pale white; B 9, clear grey, pointing towards a distant star on the N. verge of the field.

From these results, the general fixity of the components might be inferred; but I do not place great confidence in my measures, which were troubled with variable refractions.

300. 14 AURIGÆ. (Σ. 652.) CLXXXVIII.

	h.	m.	s.				s.
R. A.	**5**	**8**	**14**	Prec.	+		3·90
		°	′				″
Decl.	**N**	**32**	**33·6**	——		N	4·49

		Position.		Distance.	Epoch.
		°		″	
STRUVE, W.	A B	225·4	...	14·65	1830·55
	A C	342·3	...	12·57	
SMYTH	A B	224·5	...	13·5	1832·81
	A C	340	...	15	
WILSON and SEABROKE	A B	226·3	...	14·94	1877·15
	A C	348·4	...	12	

A fine triple star, over Auriga's right knee; about 15° down on the line which runs from α Aurigæ to β Orionis. A 5, pale yellow; B 7½, orange; C 16, purple. A and C point to a distant fourth star in the *np* quadrant.

Σ. discovered the delicate companion C, which had escaped the gaze of all other observers, and requires the most careful attention even to be perceived by occasional glimpses, but when seen, has a peculiar deep purple tint, which strikes singularly on the eye from so excessively minute an object.

[Webb noted B to be lilac in 1850.]

301. *α* AURIGÆ. CLXXXVI.

R. A.	**5h 8m 33s**	Prec.	+ 4·42s
Decl.	**N 45° 53′·5**	——	N 4·46″

		Position.		Distance.		Epoch.
		°		″		
HERSCHEL, W.	A E	151·4	...	169·0	...	1780·69
HERSCHEL, J., and SOUTH	A F	348·0	...	454·2	...	1821·22
BURNHAM	A B	317·5	...	78·1	...	1878·9
	A C	183·2	...	126·2		
	A D	315·8	...	143·2		
	A E	146·1	...	158·0		

A *Nautical Almanac* star, with several distant companions, on the right shoulder-blade of Auriga. A 1, bright white; [B 14; C 12½; D 11; E 10.]

Here the principal star is Capella, a name considered to allude to the goat and kids which Auriga, the waggoner, has charge of; but it is sometimes called *el-’áyyúḳ*, a word of doubtful origin and signification. The Arabs distinctly termed it the Guardian of the Pleiades; and many astronomers treated it as a single constellation, under the name of Hircus, or Capra, the goat. Capella is a brilliant object, and one of those stars which Piazzi attacked with the hope of detecting parallax. Sir W. Herschel measured its diameter, and concluded it to be 2·5″. Sir J. Herschel says, "I have a strong impression that Capella, within my recollection, has increased in brightness." W. Struve was of the same opinion.

Auriga is one of the original 48 asterisms, though it has gone by divers other denominations, as Heniochus, Myrtillus, Elasippus, and Erichthonius. It is thought to have been the Horus of the Egyptians; but there is a want of apparent connection between the goat, kids, and carter, and the potent son of Isis. The Arabians drew a mule, instead of the human form; but they knew the latter figure also, and called it *Mumsiki-l a’ inan*, or holder of the reins. Auriga has been thus tabulated:

Ptolemy	14 stars.	Bullialdus . . .	27 stars.
Ulugh Beigh . .	13 ,,	Hevelius	40 ,,
Tycho Brahé . .	27 ,,	Flamsteed	66 ,,
Bayer	32 ,,	Bode	239 ,,

The goat in this constellation has been recognised as Amalthæa, the nurse of Jupiter, and mother of the Ἔριφοι, Hædi, or two stars ζ and η in the arm of Auriga, emphatically termed "horrida et insana sydera:" with a third star they form an isosceles triangle. The Hædi were regarded by mariners of yore as affording presages of the weather: and they were so much dreaded, that they are said to have closed navigation at their rising. Hence, in an Epigram of the *Anthologia*, Callimachus says:

> Tempt not the winds, forewarned of dangers nigh,
> When the Kids glitter in the western sky.

Capella, the shepherd's star, is a brilliant insulated object, and therefore of easy alignment. A line drawn from Polaris perpendicular to the line of the Pointers, and on the opposite side to Ursa Major, passes, at 44° distance, through it. It will also be found by a ray projected through α and δ, the two most northern stars of the Great Bear's body, into the irregular pentagon formed by Auriga. If looking from the southward for it, take the rhymester's advice:

> From Rigel rise, and lead a line, through Bellatrix's light,
> Pass Nath, upon the Bull's north horn, and gain Capella's height—
> Where a large triangle is form'd (isosceles it seems),
> When *beta* is with *delta* join'd to lustrous *alpha's* beams.

302. β ORIONIS. (Σ. 668.) CXC.

R. A.	$5^{h}\ 9^{m}\ 15^{s}$	Prec. +	$2^{s}{\cdot}88$
Decl.	S $8^{\circ}\ 19{\cdot}9'$	—— N	$4{\cdot}40''$

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	200·7	...	9·53		1791·60 and 81·81
STRUVE, W.	199·8	...	9·14	...	1831·53
SMYTH	199·4	...	9·5	...	1832·07
WILSON and SEABROKE	201·8	...	9·5	...	1873·93

A *Nautical Almanac* star, double, in the Hero's right foot, at the commencement of the flexuous Eridanus; it is familiarly termed Rigel, from the Arabic *Rijl-al-jauzá*, the giant's leg; and Recorde assures us it was called "*Algebar* by the Arabitians." A 1, pale yellow; B 9, sapphire blue. This splendid object is somewhat difficult to measure on account of the component's disparity in magnitude and the brilliance of the large star *. [Mitchel found a distant companion of mag. 13 which Burnham places as follows:—Pos. 1·5°; Dist. 44·4″; Epoch 1877·80.]

[Webb always sees in A a blue tinge. Knott says:—"Its blue tint is one of the finest in the heavens."]

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* Dawes has shown me a diagram which he made of this delicate object, with a 2^{ft} telescope, of $1\frac{6}{10}^{in}$ aperture, made by Dollond, having a pancratic eye-piece charged with a magnifying power of seventy times. This same little instrument showed the companion to Polaris distinctly.

β Orionis has been designated *Rá'í al-Jauza* in Arabian astrognosy, as shepherd of the Jauza, whose herds, or thirst-allaying camels, are represented by α, γ, δ, and κ. Zahn tells us, in his *Oculus Artificialis*, 1702, that Francis Grindel observed through his telescope that two stars in the right foot of Orion were surrounded with great splendour, as though emulous of the Sun; and that a phenomenon resembling them in splendour cannot be found in the whole firmament. Now, as I cannot conceive either λ or τ to have been thus shining in the field with β, I can only impute the remark to a spurious image in a bad instrument, coloured by the same enthusiasm which showed Padre de Rheita the seamless coat of our Lord and a chalice in this same asterism.

Independent of the "nautis infestus Orion" character of the constellation, Rigel had one of his own; for it was to the astronomical rising of this "marinus aster" in March that *St. Marinus* and *St. Aster* owe their births in the Romish calendar. It is easy to find. A line run from the head of Leo through Procyon, arrives at Rigel; as does one from α Geminorum, by α Orionis; and the locale of the star is thus expressed:

> With glittering gems Orion's belt, his sword, his shoulders, blaze;
> While radiant Rigel on his foot pours forth its silver rays.

This was one of the stars selected by Count d'Assas de Montardier, a captain in the French Navy, for his investigations of parallax; and he concluded he had detected an amount of from one to two seconds. But as he merely observed its appulse and disappearance behind an iron frame fixed on a mountain at different periods of the year, it would be difficult to prove such a quantity, right or wrong, even if the frame were absolutely immovable during the intervals, and insensible to the variations of temperature.

303. 20 P. V. TAURI. (Σ. 670.) CXCI.

	h. m. s.		s.
R. A.	5 10 18	Prec. +	3·50
	° ′		″
Decl.	N 18 19·0	—— N	4·33

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	171·1	...	2·32	...	1830·53
Smyth	168·5	...	2·1	...	1834·89
Main	174·7	...	3·6	...	1862·10

A neat double star, on the Bull's southern horn; where a line run from the cluster in Orion's sword, and extended as far again to the N., passes upon it. A 8, and B 8½; both bluish, and lying between two stars in the *sp* and one in the *nf* quadrant, and nearest to the latter.

Struve styled A, *alba;* but in noticing so slight a difference of shade, even on so small an object, it is requisite to know to what degree his field of view was illuminated, and in what manner. It is possible that colour may interfere with our exact perception of size, which points out the necessity of obtaining greater accuracy of expression in the language of sidereal astronomy.

304. 16 AURIGÆ. (O. Σ. 103.)

		h.	m.	s.			s.
R. A.		5	10	56	Prec.	+	3·92
		°	′				″
Decl.	N	33	14·7		——	N	4·27

	Position.	Distance.	Epoch.
	°	″	
STRUVE, O.	56·5	4·5	1848·02
DEMBOWSKI	57·0	4·3	1867·40
BURNHAM	54·3	3·9	1878·65

A double star. A 5; B 11.

305. 25 P. V. TAURI. (Σ. 674.) CXCIII.

		h.	m.	s.			s.
R. A.		5	11	0	Prec.	+	3·54
		°	′				″
Decl.	N	20	0·9		——	N	4·24

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	147·3	10·5	1828·19
SMYTH	148·4	10·0	1839·76

A neat double star, in the middle of the Bull's southern horn; and about 11° along a line projected from α Tauri towards β Geminorum. A [6½,] bright white; B [9½,] bluish; and there are other companions.

306. 1780 Lac. COLUMBÆ. (*h. 3740.)

		h.	m.	s.			s.
R. A.		5	11	19	Prec.	+	2·19
		°	′				″
Decl.	S	36	46·7		——	N	4·22

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	284·7	30 *est.*	1835·99

A double star. A 7; B 8½.

307. λ AURIGÆ. (AC=Σ 3 App. II.) CXCII.

	h. m. s.		s.
R. A.	5 11 22	Prec. +	4·16
	° ′		″
Decl.	N 40 0·6	—— N	4·23

	Position.		Distance.		Epoch.
	°		″		
South	34·6	...	102·1	...	1825·10
Smyth	30·2	...	102·8	...	1835·88
Struve, O.	22·7	...	109·7	...	1852·14
Fletcher	13·9	...	121·8	...	1877·13
Burnham	A B 197·6	...	40·4	...	1879·28
	A C 13·6	...	121·5	...	

A star with a distant companion, on the Waggoner's loins; and rather more than 6° down a line drawn from α Aurigæ to γ Orionis. A 5, pale yellow; [B 13]; C 9½, plum colour. As ♅. described it merely "—multiple, —2 within 30," it is impossible to identify them in the group of small stars of the galaxy wherein they are placed. [A little coarsely-double star about 3′ distant in the *nf* quadrant, not far from the parallel, is South's C. (=Pos. 81°; Dist. 193″.) "The motion is rectilinear."—*Gledhill.*]

308. 33 ♅. VII. AURIGÆ. (h. 350; H. 1067.) CXCIV.

	h. m. s.		s.
R. A.	5 12 9	Prec. +	4·13
	° ′		″
Decl.	N 39 13·7	—— N	4·16

	Position.		Distance.		Epoch.
	°		″		
Burnham	42·8	...	33·3	...	1879·59

A very delicate double star in a group, on the Waggoner's loins. A 7½, pale white; B [11], dusky. A fine field of small stars in a rich neighbourhood, with but little disposition to form. The most prominent member is a bright orange-coloured star of the 7·8 magnitude, forming a scalene triangle, with two others to the *sf*; near it, in the *np* quadrant, is the delicate pair above estimated, while on the N. verge of the field is a triplet of 10th magnitude stars.

♅. describes it as a pretty compact cluster, "with one large star, the rest nearly of a size;" but he makes no mention of the strong colour seen both by his son and myself.

It is about 7° on the line from α Tauri towards γ Orionis, or nearly one-sixth of the distance between those stars.

309. τ ORIONIS. CXCVI.

		h.	m.	s.			s.
R. A.		5	12	16	Prec.	+	2·91
			°	′			″
Decl.	S	6	57·6		——	N	4·15

		Position.	Distance.	Epoch.
		°	″	
Hall	A B	250·1	36·0	1876·2
	A C	59·8	36·0	
	B b	49·3	3·7	
Burnham	A B	249·1	36·2	1877·9
	A C	60·0	36·1	
	B b	50·6	4·0	

An extremely delicate quadruple star, on Orion's right instep; where it is the vertex of an obtuse-angled triangle, formed with β Orionis and β Eridani. A 4, pale orange; B [14], blue; C 12, lilac; [b 16]. A B and C lie nearly in a line *sp* and *nf*. The duplicity of B was discovered by Burnham.

310. 681 Σ. AURIGÆ.

		h.	m.	s.			s.
R. A.		5	12	26	Prec.	+	4·46
			°	′			″
Decl.	N	46	51·3		——	N	4·13

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	180·5	23·4	1831·95
Burnham	180·8	23·2	1878·90

A double star. A 6½, yellowish white; B 9, bluish white.

311. 37 P. V. TAURI. (Σ. 680.) CXCV.

		h.	m.	s.			s.
R. A.		5	12	45	Prec.	+	3·56
			°	′			″
Decl.	N	20	1·2		——	N	4·10

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	201·7	8·7	1827·85
Smyth	204·1	9·0	1830·81

A very delicate double star, in the middle of the Bull's southern horn; at nearly one-third of the distance between ζ and Aldebaran. A 7, deep yellow; B 11, bluish. It is the last of a curious series of 6 stars nearly in the same declination; the one immediately preceding it being 25 P. V.

312. 28 LEPORIS. (*h. 3750.)

		h.	m.	s.			s.
R. A.		5	15	44	Prec.	+	2·56
			°	′			″
Decl.	S	21	21·2		——	N	3·86

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	295	3 *est.*	1835·9
Burnham	283·3	4·2	1879·1

A double star. A 6; B 10½. Described by Sir J. Herschel as "most beautiful."

313. 23 ORIONIS. (Σ. 696.) CXCVII.

		h.	m.	s.			s.
R. A.		5	17	3	Prec.	+	3·15
		°	′				″
Decl.	N	3	26·3		——	N	3·77

	Position.	Distance.	Epoch.
	°	″	
STRUVE	28·2	31·7	1831·44
SMYTH	27·9	32·3	1835·17
MAIN	28·4	31·1	1862·05

A neat double star in Orion's right arm-pit. A 5, white; B 7, pale grey. This is a fine object for telescopes of moderate power.

Taking all the probable errors of observation into consideration, there is perhaps no appreciable change, notwithstanding that H. in 1782 gave the distance as 26·1″.

[3° S. of γ, a little *p* it.]

314. 70 P. V. LEPORIS. (*h. 3752.)

		h.	m.	s.			s.
R. A.		5	17	15	Prec.	+	2·46
		°	′				″
Decl.	S	24	53·3		——	N	3·71

		Position.	Distance.	Epoch.
		°	″	
HERSCHEL, J.	A B	110·3	3·3	1837·30
	A C	106·1	58·8	
STONE, O.	A B	105·0	3·5	1877·0

A triple star. A 6; B $9\frac{1}{2}$; C. 9.

315. 700 Σ. ORIONIS.

		h.	m.	s.			s.
R. A.		5	17	25	Prec.	+	3·09
		°	′				″
Decl.	N	0	56·8		——	N	3·70

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	5·2	4·5	1831·48

A double star. A $8\frac{1}{2}$, white; B 9, white.

316. 698 Σ. AURIGÆ.

		h.	m.	s.			s.
R. A.		5	17	54	Prec.	+	3·98
		°	′				″
Decl.	N	34	44·8		——	N	3·66

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	346·1	31·1	1831·23

A double star. A 6·5, yellow; B $8\frac{1}{2}$, bluish.

317. 111 TAURI. CXCVIII.

	h. m. s.		s.
R. A.	5 17 59	Prec. +	3·47
	° ′		″
Decl.	N 17 17·1	—— N	3·66

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	273·8	50·4	1783·16
South	271·3	61·7	1825·06
Smyth	271·2	63	1832·95
Flammarion	271·5	75·2	1877·13
Burnham	270·7	74·8	1879·06

A star with a distant *comes*, below the middle of the Bull's southern horn, in a poor field; and in the mid-distance between γ Orionis and β Tauri. A 6, white; and B 8½, lilac.

[The distance is increasing owing to proper motion.]

318. 88 B. ORIONIS. (Σ. 701.)

	h. m. s.		s.
R. A.	5 18 2	Prec. +	2·87
	° ′		″
Decl.	S 8 31·2	—— N	3·65

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	145·9	5·9	1830·48

A double star. A 7, very white; B 9, ashy.

319. η ORIONIS.

	h. m. s.		s.
R. A.	5 18 56	Prec. +	3·01
	° ′		″
Decl.	S 2 29·9	—— N	3·58

	Position.	Distance.	Epoch.
	°	″	
Dawes	88·7	0·94	1848·11
Jacob	83·7	0·75	1853·99
Dunér	88·0	0·84	1869·19
Dembowski	84·7	1·02	1873·70
Doberck	87·3	1·12	1878·08
Burnham	81·9	1·06	1879·10

A close double star, discovered to be such by Dawes in 1848. A 4, white; B 5, purplish. The measures are very discordant.

320. 129 Dunlop HYDRI. (h. 2827; H. 1117.)

	h. m. s.		s.
R. A.	5 18 58	Prec. +	0·41
	° ′		″
Decl.	S 69 19·7	—— N	3·57

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864 :—

"Cl; L; pRi; iR; st 11 ... 16;" which means:—"a cluster; large; pretty rich; of an irregular round outline; composed of stars from the 11th to the 16th magnitudes."

321. γ ORIONIS. CC.

	h.	m.	s.		s.
R. A.	**5**	**19**	**13**	Prec. +	3·21
	°	′			″
Decl.	**N 6**	**15·0**		—— N	3·55

	Position.	Distance.	Epoch.
	°	″	
Smyth	150·0	178·0	1838·85
Challis	148·1	180·4	1841·19
Burnham	144·4	177·8	1880·00

A bright star, with a minute distant companion, on Orion's right shoulder; and one of H.'s insulated objects. A 2, pale but clear yellow; B 15, grey; a third star precedes by about 34^s, in the *sp* quadrant. γ Orionis was rejected from the *Nautical Almanac* List in 1830, there being no fewer than four others of this constellation retained as standards: it is called Bellatrix, or the female warrior, and is the smaller of the two upper stars in Orion. The gender of this star puzzles Hood, who knoweth not why it should be female, "excepte it be this, that women born under this constellation shall have mighty tongues." γ Orionis is the N.W. star of the 4 at the corners of this asterism, so to speak; and an ideal line, carried from Sirius over α Tauri to the Bull's ear, passes over it in the mid distance; the rhymester then directs,

From Bellatrix now pass a line,   to Betelgeuze the red,
And, to the north, three little stars   will mark Orion's head.

A friend considered my distance as "much too large," and the colour of A to be "reddish." On referring to Mr. Challis, that gentleman examined the object with the great Northumberland equatorial, and pronounced A to be "yellowish."

Bellatrix has a small though sensible movement in space; but the doctors differ respecting its amount and direction.

322. β TAURI. CXCIX.

	h.	m.	s.		s.
R. A.	**5**	**19**	**20**	Prec. +	3·78
	°	′			″
Decl.	**N 28**	**31·0**		—— N	3·53

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	225·0	14·5	1836·65

A *Nautical Almanac* star, with a distant companion, and three other small stars in the field, forming a regular figure with the 2 preceding and 2 following β. A 2, brilliant white; B 10, pale grey. This object, β, is on the very tip of the horn of Taurus, and therefore at the greatest distance from the hoof. This position gained it the name of Nath, from *Al-náṭiḥ*, the butting; and as it is also in the Waggoner's left ancle, it was called *Kab'dhí-l-'inán*, *i.e.*, heel of the rein-holder, and entered on several Catalogues as γ Aurigæ. In finding Nath by alignment, it must be sought about half-way between the Pleiades and Pollux; or, following the poet's dogma, a line sent

> From centre of Orion's belt to where Capella's seen,
> Will point to the observant eye Nath in mid-way between.

323. 84 P. V. ORIONIS. (Σ. 708.) CCI.

		h.	m.	s.		s.
R. A.		5	19	28	Prec. +	3·11
		°	′			″
Decl.	N	1	49·4		—— N	3·52

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	322·8	...	2·0 ±	...	1782·76
STRUVE, W.	323·2	...	2·61	...	1831·81
SMYTH	322·5	...	2·6	...	1835·11
MAIN	305·9	...	2·4	...	1862·11

A close double star on Orion's right side; where a line from Orion's belt towards α Tauri passes it at about 4½° below γ Orionis. A 8, silvery white; B 10, grey. This delicate object was placed by Σ. in his First Class, "plurium maxima." There are few close double stars whose fixity for upwards of half a century has been more satisfactorily proved than this, so Main's angle would seem to be a misprint.

324. 79 M. LEPORIS. (H. 1112.) CCIII.

		h.	m.	s.		s.
R. A.		5	19	53	Prec. +	2·47
		°	′			″
Decl.	S	24	36·9		—— N	3·53

A bright stellar nebula, of a milky white tinge, under the Hare's feet, the following edge of whose disc just precedes a line formed by two stars lying across the vertical, and it is followed nearly on the parallel by a 9th magnitude star. It is a fine object, blazing towards the centre, and was discovered by Méchain in 1780. It was resolved by H. into a mottled nebulosity, in 1783, with a 7ft telescope; but on applying the 20ft in the following year, he fairly made it a "beautiful cluster of stars nearly 3 minutes in diameter, of a globular construction, and certainly extremely rich." The mean apparent place is obtained by differentiation from ξ Leporis, a fine white star, with a red companion of the 7th magnitude in the *np* quadrant.

An imaginary line run from α Orionis before α Leporis and over β will hit this object about 4° S.W. of the latter.

325. 39 H̶. VII. AURIGÆ. (h. 354; H. 1114; Ɍ.) CCII.

	h.	m.	s.		s.
R. A.	**5**	**20**	**38**	Prec. +	4·00
	°	′			″
Decl.	**N 35**	**13·3**		—— N	3·48

	Position.	Distance.	Epoch.
	°	″	
Smyth	235	5	1836·79

A minute double star announces this cluster, on the robe under the left thigh of Auriga. A 9½ and B 11, both grey. The object is a compressed oval cluster of 10th to 14th magnitude stars, about 3′ in diameter, trending *sf* and *np*, with a pair of 10th magnitude stars to the N.; in a splendid district of the heavens.

It is about 12° down on the line which the eye projects from α Aurigæ towards α Orionis, and is there intercepted by another line drawn from γ Orionis through β Tauri, and extended 6½° beyond.

["Neat little cluster. Its centre consists of about 40 or 50 stars; the outlying stars are arranged in curved branches."—*Parsonstown Obs.*]

326. ψ^2 ORIONIS.

	h.	m.	s.		s.
R. A.	**5**	**21**	**3**	Prec. +	3·14
	°	′			″
Decl.	**+ 3**	**0·0**		—— N	3·39

	Position.	Distance.	Epoch.
	°	″	
Knott	322·1	2·5	1863·15
Dembowski	324·9	2·6	1875·10

A neat double star discovered by Knott in 1863. A 5½, yellow; B 11, blue. A little *sp* is Σ. 712 (Pos. 55°; Dist. 2·9″; Epoch 1878·0), which is a double star, mags. 7 and 9, the angle of which is evidently increasing.

327. 10254 Lal. LEPORIS. (*h. 3759.)

	h.	m.	s.		s.
R. A.	**5**	**21**	**15**	Prec. +	2·59
	°	′			″
Decl.	**S 19**	**46·6**		—— N	3·37

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	315·2	28·7	1837·95
Stone, O.	317·4	27·9	1877·10

A double star. A 6; B 9.

328. — COLUMBÆ. (*h. 3760.)

	h.	m.	s.		s.
R. A.	5	21	58	Prec. +	2·13
		°	′		″
Decl.	S	35	26·7	—— N	3·32

		Position.	Distance.	Epoch.
		°	″	
Herschel, J.	A B	221·3	7·3	1835·57
	A C	271	20±	1836·02

A triple star, A 6; B 7; C 11.

329. 38 M. AURIGÆ. (H. 1119; ℞.) CCIV.

	h.	m.	s.		s.
R. A.	5	22	2	Prec. +	4·02
		°	′		″
Decl.	N	35	44·1	—— N	3·39

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	251	14·5	1835·80

A rich cluster of minute stars, on the Waggoner's left thigh, of which a remarkable pair in the following part are here estimated. A 7, yellow; and B 9, pale yellow; having a little companion about 25″ off in the *sf* quadrant. Messier discovered this in 1764, and described it "a mass of stars of a square form without any nebulosity, extending to about 15′ of a degree;" but it is singular that the palpable cruciform shape of the most clustering part did not attract his notice. It is an oblique cross, with a pair of large stars in each arm, and a conspicuous single one in the centre; the whole followed by a bright individual of the 7th magnitude.

The very unusual shape of this cluster recalls the sagacity of Sir W. Herschel's speculations upon the subject, and very much favours the idea of an attractive power lodged in the brightest part. For although the form be not globular, it is plainly to be seen that there is a tendency towards sphericity, by the swell of the dimensions as they draw near the most luminous place, denoting, as it were, a stream, or tide of stars, setting towards a centre. As the stars in the same nebula must be very nearly all at the same relative distances from us, and they appear to be about the same size, Sir William infers that their real magnitudes must be nearly equal. Granting, therefore, that these nebulæ and clusters of stars are formed by their mutual attraction, he concludes that we may judge of their relative ages by the disposition of their component parts, those being the oldest which are the most compressed.

To fish up this object, a line from β Orionis must be carried northwards through β Tauri, on the tip of the Bull's left horn, and about 7° beyond, where it will be intersected by the ray from α Aurigæ to α Orionis.

[" Glorious neighbourhood."—*Webb.*]

[" Query, if the right place?"—*Parsonstown Obs.* But this query applies to Sir J. Herschel's place, which for 1890 is R. A. 5h 21m 17s.]

330. 118 TAURI. (Σ. 716.) CCV.

	h.	m.	s.			s.
R. A.	**5**	**22**	**30**	Prec.	+	3·68
		°	′			″
Decl.	**N**	**25**	**3·6**	——	N	3·24

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	192·7	...	5·0	...	1782·94
Struve, W.	196·7	...	4·8	...	1829·63
Smyth	195·9	...	5·0	...	1838·91
Wilson and Seabroke	200·1	...	5·0	...	1874·10
Jedrzejewicz	200·7	...	5·1	...	1880·09

A very neat double star, between the tips of the Bull's horns; and mid-way between the Pleiades and δ Geminorum. A 7, white; B 7½, pale blue.

331. 175 Dunlop DORADÛS. (h. 2844; H. 1142.)

	h.	m.	s.			s.
R. A.	**5**	**22**	**36**	Prec.	−	0·21
		°	′			″
Decl.	**S**	**68**	**4·7**	——	N	3·25

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; p B; S; R; 4th of Group;" which means:—"a remarkable object; pretty bright; small; round; the 4th of a group." The other members of this group are all very faint.

Engraved, *Cape Obs.*, Pl. iii. Fig. 2.

332. 109 P. V. ORIONIS. (Σ. 722. rej.) CCVII.

	h.	m.	s.			s.
R. A.	**5**	**23**	**25**	Prec.	+	2·87
		°	′			″
Decl.	**S**	**8**	**28·0**	——	N	3·14

	Position.		Distance.		Epoch.
	°		″		
Burnham	300·3	...	26·2	...	1880·00

A delicate double star, in the space between Orion's right heel and left knee; where it may be found by drawing a line from the third star in Orion's belt, over the sword cluster, and carrying it nearly as far again beyond. A 7½, pale white; and B 10, blue. This pretty object was Σ.'s

722, but is not placed among his measured stars; being branded in the great *Catalogue* with "*rej.*" It is in a barren but brightish field, in which an occasional glow seems to verify the "diffused nebulosity" which H.'s powerful light-grasping 20^{ft} reflector saw.

333. β LEPORIS. CCVIII.

R. A.	$5^{h}\ 23^{m}\ 31^{s}$	Prec. + $2^{s}{\cdot}57$
Decl.	S $20^{\circ}\ 50'{\cdot}8$	—— N $3''{\cdot}19$

		Position.	Distance.	Epoch.
Herschel, J.	A C	145°·9	70″ *est.*	1834·94
Burnham	A B	288·3	2·68	1879·88
	A D	75·0	206·3	
	A E	57·6	241·5	

[A close double star with distant telescopic companions, between the legs of Lepus. A 3, deep yellow; B 11; C 12; D 11; E 10.] This star is often called Nihal, but the name is more properly applied to α, β, γ, and δ, the Arabian *Al-nihál*, or thirst-slaking camels; it will be identified by drawing a line from the middle star of Orion's belt, through the sword, and extending it 3° below α Leporis. [Estimates of A's mag. vary. Gould puts it at 3; and so Flamsteed and Lalande: but Argelander has $3\frac{1}{3}$; Piazzi, and Taylor, 4. About $1^{m}\ 50^{s}$ preceding this star is a pretty pair (= β 319) of mags. $7\frac{1}{2}$ and $10\frac{1}{2}$, of which Dembowski gives: Pos. 231°; Dist. 3·9″; Epoch 1876·1.]

334. 96 B. AURIGÆ. (Σ. 718.)

R. A.	$5^{\circ}\ 23^{m}\ 43^{s}$	Prec. + $4^{s}{\cdot}60$
Decl.	N $49^{\circ}\ 18'{\cdot}3$	—— N $3''{\cdot}16$

	Position.	Distance.	Epoch.
Struve, W.	74°·1	7″·8	1829·90
Main	74·2	7·7	1863·22

A double star. A 8, very white; B 8, very white.

335. 31 ORIONIS. (Σ. 725.)

R. A.	$5^{h}\ 23^{m}\ 59^{s}$	Prec. + $3^{s}{\cdot}04$
Decl.	S $1^{\circ}\ 10'{\cdot}8$	—— N $3''{\cdot}12$

	Position.	Distance.	Epoch.
Struve, W.	87°·5	12″·7	1829·41
Stone, O.	88·4	12·7	1879·09

A double star. A $5\frac{1}{2}$, golden; B 11, blue. The colour of A has attracted the notice of many observers. Lalande called it "rouge;" Schmidt "gelb-roth;" Birmingham, "light orange." The last-named observer remarked on the contrast it afforded to its blue *comes* in 1876.

336. 261 ♅. I. AURIGÆ. (h. 355; H. 1137; 𝕶.) CCVI.

R. A.	**5h. 24m. 9s.**	Prec.	+ 3s·97
Decl.	**N 34° 9′·6**	——	N 3″·13

A resolveable nebula, on the lower garment of Auriga, about 2·5m *sf* 38 M. ♅. remarked that it "seems to have one or two stars in the middle, or an irregular nucleus." This object was next examined by H., who described it as a nebula including a triple star, surrounding them like an atmosphere. The nebula is situated in a rich field of minute stars, with 5 of the 10th magnitude, disposed in an equatorial line above, or to the S. of it, and preceded by a bright yellow 7½ magnitude star in the same direction. After intently gazing, under moderate power, the triangle rises distinctly from the star-dust, and presents a singular subject for speculation.

[" Very faint: not resolveable in any ordinary telescope."—*Brodie.*]

[Engraved in *Phil. Trans.*, 1833, Pl. v. Fig. 49.]

337. 32 ORIONIS. (Σ. 728.) CCIX.

R. A.	**5h. 24m. 54s.**	Prec.	+ 3s·20
Decl.	**N 5° 52′·0**	——	N 3″·10

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	217·8	1½ ±	1782·05
STRUVE, W.	203·7	1·04	1830·96
SMYTH	206·2	1·0	1839·20
JACOB	202·4	1·71	1853·43
SPÖRER	188·9	0·44	1877·19
BURNHAM	196·6	0·48	1878·50

A close double star, on Orion's right shoulder. A 5, bright white; B 7, pale white. This elegant object was discovered by ♅., and his observations compared with later results show retrograde motion [and a diminution in the distance; though the observations as set out in full by Gledhill are very discordant.]

A line from the leading star of Orion's belt carried towards β Tauri passes 32 Orionis at rather more than 6°, where it will be seen just to the E. of γ Orionis.

338. 33 ORIONIS. (Σ. 729.) CCX.

		h.	m.	s.			s.
R. A.		5	25	28	Prec.	+	3·14
			°	′			″
Decl.	N		3	12·5	——	N	3·02

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	26·2	2·02	1822·02
Struve, W.	25·6	1·87	1831·22
Smyth	25·8	2·0	1838·21
Dunér	26·2	1·7	1872·86

A close double star, on Orion's right shoulder, where it is a little more than one-third of the distance from Bellatrix to the last, or following star of Orion's belt. A 6, white; B 8, pale blue; with a distant 8th magnitude star in the *np* quadrant. This superb object is not of very difficult measurement, though rated as one of Σ.'s "vicinæ." No change in the angle; but as H. says the stars were only half the diameter of the small star apart, the distance may possibly have increased.

[Between γ and ζ, but nearer the former.]

339. 730 Σ. TAURI.

		h.	m.	s.			s.
R. A.		5	25	51	Prec.	+	3·47
			°	′			″
Decl.	N		16	58·1	——	N	2·97

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	141·8	9·8	1831·42

A double star. A 7, very white; B 7½, very white.

340. δ ORIONIS. (Σ. 14 App. I.) CCXI.

		h.	m.	s.			s.
R. A.		5	26	23	Prec.	+	3·06
			°	′			″
Decl.	S		0	22·9	——	N	3·00

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	358·2	52·9	1779·77
Struve, W.	359·2	52·7	1835·70
Main	359·0	53·6	1863·06
Jedrzejewicz	359·6	52·8	1877·82

A *Nautical Almanac* star, coarsely double; it is the leader of the three "bullions" in Orion's girdle or belt, and nearly on the equator. A 2, brilliant white; B 7, pale violet. [Burnham has found a very minute companion of mag. 14, in Pos. 227°; Dist. 33·8″; Epoch 1878·9. This is β 558.]

The coincidence of these results proves the fixity of the large star, and militates against the large amount of proper motion which has been imputed to it.

This star being the leader in Orion's beautiful belt, has been popularly distinguished under various names. Among astronomers it is usually known as Mintaka, from the Arabian *Minṭaḳah-al-jauza*, the giant's belt; which some people also designated *al-leḳaṭ*, the gold grains or spangles. It was also called, with its associates, *Jacob's staff*, perhaps from the traditional idea mentioned by Eusebius, that Israel was an astrologer. It was also the *Golden Yard* of seamen, the *Three Kings* of soothsayers, the *Ell-and-yard* of tradesmen, the *Rake* of husbandmen, and *Our Lady's Wand* of the Papists. The belt points on one side to Sirius, the brightest of all the stars; and on the other to the Hyades and Pleiades; and the rhymester points out the individual before us:

> In the blue vast, Orion's Belt shines with its bullions three,
> And of those bright conspicuous gems the first as *delta* see.

341. 1 M. TAURI. (h. 357; H. 1157; ℞.) CCXII.

R. A.	5h. 27m. 51s.	Prec.	+ 3s·60
Decl.	N 21° 56′·6	——	N 2″·80

A large nebula, pearly white, about 1° N.W. of the star ζ on the tip of the Bull's southern horn, and on the outskirts of the Galaxy. It is of an oval form, with its axis-major trending *np* and *sf*, and the brightest portion towards the S. Sir J. Herschel registers this in his *Catalogue* of 1833 as a "barely resolvable cluster;" and figures it with a fair elliptical boundary. He applied his 7, 10, and 20ft reflectors, and endeavoured to ascertain its relative distance by a modification of their space-penetrating capacity. "As all the observations," he concludes, "of the large telescopes agree to call this object resolveable, it is probably a cluster of stars at no very great distance beyond their gauging powers; its profundity may therefore be of about the 980th order." All this shows the difficulty of what to my view is rather a milky nebulosity than a cluster. The powerful telescope constructed by Lord Rosse, however, not only displays the component stars distinctly, but also shows several fringy appendages around, and a deep bifurcation to the S. So do sidereal wonders increase with our optical means.

This fine nebula is remarkable as having been discovered by M. Messier —the comet-ferret of Louis XV.—while observing ζ Tauri and a comet in 1758, when he caught up a "whitish light, elongated like the flame of a taper." This accident induced him to form his well-known and useful *Catalogue* of nebulæ and clusters, from the observations of himself, La

Caille, and Méchain, in order to prevent astronomers from mistaking any of those objects for comets; and the List of 103 which he furnished to the public was considered to have scraped them all together, as far as climate permitted. Whence D'Alembert, speaking of Messier, observed, "on ne peut s'empêcher de regretter qu'un Observateur si exact et si plein de zèle, n'ait pas été placé dans un climat plus heureux." But the progress of astronomy has not depended upon climate, as the names of Tycho, Römer, Flamsteed, Bradley, Hevelius, Huyghens, Schröter, Olbers, and others of the ιερὰ φάλανξ, abundantly testify. Indeed, in the department before us, within twenty years of Messier's publication, the illustrious Sir W. Herschel increased the 103 by 2500 new members, in the decried climate of England, thus affording a strong instance how moral causes căn control the physical. Piazzi, whose observatory in the Conca d'Oro was to the eye most charmingly situated, was so troubled with a peculiar flickery hot aerial refraction, that one night he exclaimed to me, "Ah, Greenwich is the paradise for an observer!"

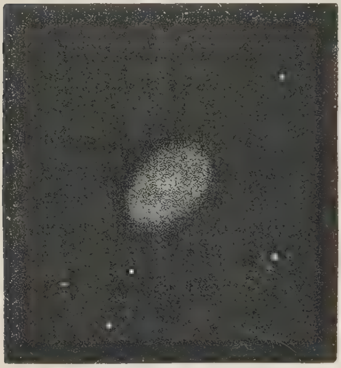

FIG. 8. 1 M. TAURI.

It is rather curious, on recollecting that this nebula was first caught up in seeking the comet of 1759, that it was also a mare's nest to more than one astronomical tyro in August, 1835, when on the look-out for the return of Halley's comet, in the very month in which it had first been seen 77 years before: and ζ Tauri was also the star which served as a "pointer" on that interesting advent.

[Engraved in *Phil. Trans.*, 1833, Pl. viii. Fig. 81; 1844, Pl. xix. Fig. 81; Rosse, woodcut, *Phil. Trans.*, 1861; D'Arrest, *Dissertation*, 1861, Pl. ii. Fig. 4; Lassell, *Mem. R.A.S.*, xxiii, Pl. ii. Fig. 1; Rosse, Dublin *Trans.*, Pl. ii. Fig. 1157.]

[Dreyer remarks:—"No published drawing is satisfactory: the one in *Phil. Trans.*, 1844 [Rosse], is not at all like the object. The diagram in *Phil. Trans.*, 1861, gives a very fair general idea of its form, the dark lanes," &c.]

342. α LEPORIS. CCXIII.

		h. °	m. ′	s.			s. ″
R. A.		5	27	52	Prec.	+	2·64
Decl.	S	17	54·2		——	N	2·80

	Position. °		Distance. ″		Epoch.
Herschel, J.	154·8	...	25	...	*not stated.*
Stone, O.	156·0	...	35·6	...	1877·11

A *Nautical Almanac* star of 1830, with a distant companion, on the body of Lepus. A 3½, pale yellow; B 9½, grey; a bright 6th magnitude in the *np* quadrant. This object is easily found by alignment; for a ray carried from ε, the central star of Orion's belt, through θ and its nebulous patch on the sword, as low down as Sirius, falls upon α Leporis; it is thus recorded in galley-rhymes:

> Orion's image, on the south, has four stars—small but fair:
> Their figure quadrilateral points out the timid Hare.

This asterism is one of the old 48, and is said to have been placed immediately below Orion, as emblematic of caution and celerity. The Arabians called α, Arneb, from *al-arneb*, the hare; it was also, in conjunction with β, γ, and δ, named Kursa, from *Kursá-l-jaúzá*, or *'Arsh-al-jaúzá*, the giant's chair or throne. It is a poorish constellation—if such a term may be applied to those wondrous assemblages—and has been thus registered:

Ptolemy . . .	12 stars.	Hevelius . . .	16 stars.
Tycho Brahé . .	13 ,,	Flamsteed . . .	19 ,,
Bayer	14 ,,	Bode	66 ,,

343. 36 M. AURIGÆ. (h. 358; H. 1166; Σ. 737; ℞.) CCXIV.

	h.	m.	s.			s.
R. A.	5	29	2	Prec.	+	3·96
		°	′			′
Decl.	N	34	4·2	——	N	2·70

	Position. °		Distance. ″		Epoch.
Struve, W.	305·0	...	10·6	...	1829·24
Smyth	308·7	...	12	...	1836·71

A neat double star in a splendid cluster, on the robe below the Waggoner's left thigh, and near the centre of the Galaxy stream. A 8, and B 9, both white; in a rich though open splash of stars from the 8th to the 14th magnitudes, with numerous outliers, like the device of a star whose rays are formed of small stars. The double star, as H. remarks, is admirably placed for future astronomers to ascertain whether there be internal motion in clusters.

A line carried from the central star in Orion's belt, through ζ Tauri, and continued about 13° beyond, will reach the cluster, which follows φ Aurigæ by about 2°.

344. λ ORIONIS. (Σ. 738.) CCXV.

	h. m. s.		s.
R. A.	5 29 5	Prec. +	3·30
Decl.	N 9° 51′·5	—— N	2″·70

		Position.	Distance.	Epoch.
Herschel, W.	A B	44°·8	5″·8	1779·88
Struve, W.	A B	40·5	4·2	1830·81
Smyth	A B	43·0	4·5	1843·19
Dunér	A B	43·6	4·1	1870·22
Jedrzejewicz	A B	43·0	4·3	1879·30
Burnham	A C	182·7	28·6	1880·07

A neat double star, in Orion's ear; where it will be seen at about 5° on a line shot from *α* Orionis to *α* Tauri, being the northern of the three small stars forming Orion's head. A 4, pale white; and B 6, violet. [A yellow; B blue.—*Dembowski.*] This fine object appears to be fixed.

This double star, and the two *ϕ*'s in Orion's head, forms, says Kazwíní, an *athäfí* constituting the Vth Lunar Mansion; the peculiar aspect of which gained λ the name of Heka, from *al-hek'ah*, a white spot. On the early application of the telescope to this spot, Galileo found it to consist of 21 stars; but this definition of it does not seem to have obtained generally. "It is evident," says H., "the whole appeared nebulous to Flamsteed for no other reason than because his telescope had not sufficient power to distinguish them." Hence the term, *in capite nebulosa*, of the Catalogues. It forms the apex of a triangle, the base of which extends between *α* and *γ* Orionis.

[Gould considers this star certainly variable to the extent of "more than half a unit."]

345. 743 Σ. ORIONIS.

	h. m. s.		s.
R. A.	5 29 16	Prec. +	2·97
Decl.	S 4° 28′·2	—— N	2″·60

	Position.	Distance.	Epoch.
Struve, W.	277°·7	1″·82	1830·70
Stone, O.	278·2	1·90	1879·10

A double star. A 7½, very white; B 8½, very white.

346. 133 B. ORIONIS. (Σ. 747.)

	h. m. s.		s.
R. A.	5 29 48	Prec. +	2·93
Decl.	S 6° 5′·3	—— N	2″·63

	Position. °	Distance. ″	Epoch.
STRUVE, W.	223·1	35·8	1833·59
MAIN	223·2	36·0	1871·21
JEDRZEJEWICZ	223·1	35·9	1879·60

A double star. A 6, yellowish; B 7, ashy.

347. 380 B. TAURI. (Σ. 742.)

R. A. 5h 29m 50s | Prec. + 3·60s

Decl. N 21° 55′·8 | —— N 2″·63

	Position. °	Distance. ″	Epoch.
STRUVE, W.	247·1	3·18	1828·19
MÄDLER	249·7	3·47	1841·22
DAWES	251·3	3·26	1852·64
MAIN	251·7	3·46	1863·23
TALMAGE	255·8	3·66	1872·14

A double star. A 8, yellowish; B 8½, white. A slow increase in the angle is certainly taking place.

348. θ¹ ORIONIS. (M. 42; h. 360; H. 1179; Σ. 748; Ɍ.) CCXVI.

R. A. 5h 29m 52s | Prec. + 2·94s

Decl. S 5° 27′·7 | —— N 2″·64

		Position. °	Distance. ″	Epoch.
SMYTH	A B	311·1	13·0	1834·07
	A C	60·2	13·5	
	A D	344·7	16·7	
	B E	350	5	
JEDRZEJEWICZ	A B	31·9	8·7	1877·8
	A C	131·6	12·8	
	A D	95·6	21·4	
	B C	162·7	16·9	
	B D	299·6	19·2	
	C D	241·0	13·3	

A multiple star, the beautiful trapezium in the "Fish's mouth" of the vast nebula in the middle of Orion's sword-scabbard. A 6, pale white; B 7, faint lilac; C 7½, garnet; D 8, reddish; and E 10½, blue. This had the honour of being the object to which the grand 40ft reflector was first directed by Ħ., in February, 1787, and by him was designated "quadruple." As a trapezium it was gazed at, measured, and delineated, for upwards of 50 years, when Σ. announced it "quintuplex," by the addition of the little star E. Now when we consider the eye of Ħ., the measures of South, and the rigorous examination of H., this little companion must be looked upon as variable; indeed nothing can exceed the confidence with which H. assured me of its not being visible when he made the beautiful drawing of 1824, confirmed by himself and Mr. Ramage on the 13th of March, 1826; and yet in 1828 it was not to be overlooked but by wilful inattention.

[A 6th star of mag. 12, now known as F, was detected by Sir J. Herschel in 1830, and since then some others have been seen with more or less certainty, and Huggins now puts the number of the constituents at 9. (See the *Handbook of Astronomy*, 3rd ed., p. 532.) There being so many stars to deal with, it becomes rather a complicated matter to tabulate angles and distances, and it is best to have resort to a diagram. In the opinion of O. Struve, no changes in angle or distance have taken place since the earliest observations: he thinks, however, that E and F, and perhaps some of the others, are variable. His measures of AF are:—Pos. 131°; Dist. 3·8″; Epoch 1870·70.]

Ptolemy, Tycho Brahé, and Hevelius ranked θ of the 3rd magnitude, as did Bayer in his *Uranometria*, all evidently supposing the two contiguous stars and the bright spot constituted a single star. The effulgent nebula in which it is placed, familiarly called the Fish's head, with its streaming appendages, certainly has an irregular resemblance to the head of some monster of the polyneme genus. Its brilliancy is not equal throughout, but the glare of the brighter parts gives intensity to the darkness which they bound, and excite a sensation of looking through it into the luminous regions of illimitable space, a sensation not entirely owing to any optical illusion of contrast. This supposition must have forced itself upon Huyghens, independently of any recollection of the empyrean heaven of the ancients; and had Voltaire seen the object under powerful means, he would hardly have lashed Dr. Derham for asking whether nebulæ be not this shining region, seen through a chasm of the *primum mobile*. Another wonderful singularity is, that the nebulous and apparently attenuated matter seems to recede from the stars of the trapezium, so as to leave a black space around each, between them and the glow, as though they were either repelling or absorbing it.

This is a most splendid object under any telescope, but the greater the optical power applied, the more inexplicable does it become. My own telescope showed it to very great advantage, but it is here where the light-grasping quality of reflectors is brought advantageously to bear. Thus in the 20ft telescope at Slough, Sir J. Herschel gained perceptions of its modification which were not decided to my view. "I know not," he says, "how to describe it better than by comparing it to a curdling liquid, or a surface strewed over with flocks of wool, or to the breaking up of a mackerel sky, when the clouds of which it consists begin to assume a cirrous appearance. It is not very unlike the mottling of the sun's disc, only, if I may so express myself, the grain is much coarser, and the intervals darker; and the flocculi, instead of being generally round, are drawn into little wisps. They present, however, no appearance of being composed of stars, and their aspect is altogether different from that of resolveable nebulæ." Such, at present, are the only ascertained peculiarities of the wondrous mass. It is pronounced to be of the singular nature termed milky nebulosity by Sir W. Herschel. "To attempt," he remarks, "even at a guess at what this light may be, would be presumptuous. If it should be surmised, for instance, that this nebulosity is of the nature of the zodiacal light, we should then be obliged to admit the existence of an effect without its cause. An idea of a phosphorical condition is not more philosophical, unless we could show from what source of phosphorical matter such immeasureable tracts of luminous phenomena could draw their existence and permanency: for though minute changes have been observed, yet a general resemblance, allowing for the difference of telescopes, is still to be perceived in the great nebulosity of Orion, ever since the time of its first discovery." This illustrious astronomer was, at first, inclined to consider all the nebulæ as resolveable, but this *milky* instance, with that in Andromeda, contradicted the notion, and led him to inferences respecting nebulous matter, and its possible gradation to stars by condensation, so as to form a distinct and plausible theory of cosmogony.

We are told that this nebula was one of the first-fruits of Galileo's telescope; but it is certain that Huyghens discovered it by accident in 1656, as stated in his *Systema Saturnium*, where he notes, "Portentum, cui certe simile aliud nusquàm apud reliquas fixas potuit animadverti." From a comparison of the descriptions and drawings of this object, since his time, great alterations might be inferred; but astronomical delineation was not then sufficiently advanced to render the diagrams at all satisfactory, nor were the instruments sufficiently powerful. Thus, while one man thinks his $3\frac{1}{2}^{\text{ft}}$ telescope indicated "myriads upon myriads" of stars in its composition, Lord Rosse, with the most powerful and perfect instrument then extant, gained no appearance of resolution. It may therefore be concluded, that the first rigidly accurate representation of it, is that by Sir J. Herschel; and he who wishes to acquire all the actual knowledge we at present possess on the subject, cannot refer to a better

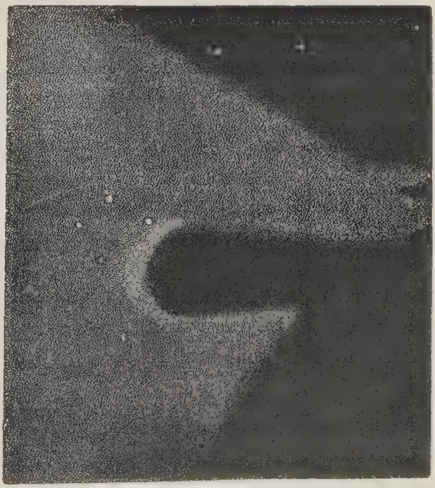
FIG. 9. θ^1 ORIONIS.

description than that contained in his paper, published in the *Memoirs of the Astronomical Society*, vol. iii. "Several astronomers," says Sir John, "on comparing this nebula with the figures of it handed down to us by its discoverer, Huyghens, have concluded that its form has undergone a perceptible change; but when it is considered how difficult it is to represent such an object duly, and how entirely its appearance will differ even in the same telescope, according to the clearness of the air, or other temporary causes, we shall readily admit that we have no evidence of change that can be relied on." To the drawing which illustrates that account, posterity will refer with confidence, in order to "catch Nature in the fact:" meantime, it seems clear, that if the parallax of this nebula be no greater than that of the stars, as one hypothesis assumes, its breadth cannot be less than a hundred times that of the diameter of the Earth's orbit: but if, as is still more probable, at a vast distance beyond, its magnitude must be utterly inconceivable.

This luminous spot is so well known to all star-gazers, that it is hardly necessary to add, that a line projected from α Orionis, through ζ, the third of the belt, will pass upon θ and the nebula, in the sword-scabbard. The portion called the Fish's mouth, with the well-known trapezium, is rudely sketched in the preceding figure.

θ^2 Orionis, which is 133″ from θ^1, on an angle = 135°, is coarsely double, of the 6th and 7th magnitudes. At the epoch above named, viz. 1834·07, the components measured 91·5° as the angle of position, and 52″ for the distance.

[Observations during the last 40 years have given rise to strange discrepancies in the accounts of different observers, both as to the nature and as to the physical appearance of this object. Many have asserted that it has undergone change, but the evidence as to this falls far short of what is needed for absolute proof. Huggins as the result of spectrum observations asserts that it is *gaseous!*]

[Engraved in *Cape Obs.*, Pl. viii. Fig. 1; Bond, *Trans. Amer. Acad.*, N.S., vol. iii. p. 96: Lassell, *Mem. R.A.S.*, vol. xxiii. Pl. i. Fig. 1.]

349. ι ORIONIS. (Σ. 752.) CCXVIII.

		h.	m.	s.			s.
R. A.		5	30	3	Prec.	+	2·93
			°	′			″
Decl.	S		5	59·0	——	N	2·60

		Position.	Distance.	Epoch.
		°	″	
Struve, W.	A B	142·2	11·3	1831·86
Smyth	A B	141·7	11·5	1832·13
	A C	102·8	48·9	
Dawes	A B	141·2	11·6	1847·65
Main	A B	139·5	11·2	1863·06

A fine triple star, in a good field on Orion's sword-scabbard; and 5°

S. of the middle star in the belt. A 3½, white; B [8], pale blue; and C 11, grape red. Piazzi says of ι, in his *Notæ*, "Duplex: comes 0·4″ temporis sequitur, et vix distingui potest,"—but his instrument being fully equal to distinguish such a magnitude as that of B, his remark excites a suspicion that it may be variable. There is a glow about this object when viewed under favouring circumstances; yet I cannot assert that the nebulosity in which it is enveloped is clearly seen. But under proper means it is well worth scrutiny; for nebulous stars are certainly among the most remarkable objects in the heavens, and perhaps should be distinguished from stellar nebulæ in being of a less doubtful character as to the state of condensation, the central matter in such being suddenly vivid and sharply defined.

When Sir J. South re-examined this star, in 1824, A and B were considered, from the apparent change of angle in 45 years, to have a direct orbital motion = + 0·2° per annum; but more recent observations do not support the inference.

[The synonymes of this as a nebula are 31 H. V.; h. 361; H. 1183.]

350. 362 h. ORIONIS. (H. 1184; R.; Σ. 750.) CCXVII.

		h. m. s.			s.
R. A.		**5 30 4**	Prec.	+	2·97
Decl.	**S**	**4° 25′·4**	——	N	2″·60

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	59·2	...	4·3	...	1831·21
Dawes	61·8	...	4¼ ±	...	1840·14
Main	61·8	...	3·7	...	1870·06
Stone, O.	58·6	...	4·3	...	1879·09

A delicate double star in the wide-spread cluster on Orion's sword. A 6, lucid white; B 9, pale blue. The principal members of this group of stars are of the 6th and 7th magnitudes, with some smaller; and from their brightness and disposition form a capital test for the light of a telescope.

351. 43 M. ORIONIS. (H. 1185.)

		h. m. s.			s.
R. A.		**5 30 6**	Prec.	+	2·95
Decl.	**S**	**5° 20′·5**	——	N	2″·61

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"! v B; v L; R, with tail; mb M * 8·9;" which means:—"a remarkable and very bright object; very large; round with a tail; much brighter in the middle where there is a star of the 8·9 magnitude."

Engraved, *Cape Obs.*, Pl. viii. Fig. 1; Bond, *Trans. Amer. Acad.*, N.S., vol. iii. p. 96; Lassell, *Mem. R. A. S.*, vol. xxiii. Pl. i. Fig. 1.

352. 749 Σ. TAURI.

	h.	m.	s.			s.
R. A.	5	30	16	Prec.	+	3·74
		°	′			″
Decl.	N	26	51·5	——	N	2·95

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	23·4	...	0·70	...	1827·26
Mädler	18·9	...	0·77	...	1844·04
Struve, O.	17·0	...	0·80	...	1849·24
Romberg	186·9	...	0·8	...	1864·20

A double star. A 7½, very white; B 8, very white. Slow retrograde motion.

353. 214 Dunlop DORADÛS. (h. 2890; H. 1205.)

	h.	m.	s.			s.
R. A.	5	30	24	Prec.	—	0·05
		°	′			″
Decl.	S	66	57·9	——	N	2·58

A nebula thus described in Sir. J. Herschel's *Catalogue* of 1864:—"v B; S; R; ⁑+neb in v L cl;" which means:—"very bright; small; round. There is a double star besides the nebula in a very large cluster."

354. ε ORIONIS. (34 H. V.; h. 363; H. 1193; R.) CCXIX.

	h.	m.	s.			s.
R. A.	5	30	38	Prec.	+	3·04
		°	′			″
Decl.	S	1	16·4	——	N	2·53

	Position.		Distance.		Epoch.
	°		″		
Burnham	57·0	...	179·9	...	1879·90

A *Nautical Almanac* star, in the centre of Orion's belt, with a distant companion. A 2½, bright white, and nebulous; B 10, pale blue. This fine star, rated a full 2nd magnitude by Flamsteed, is in a neat trapezium of the 8th magnitude, in a rich vicinity. It is often called Alnilam, from the Arabic *Al-Nidhám*, or *Nizám*, the string of pearls, in allusion to its situation between ζ and δ, forming, as Robert Recorde says, the bullions set in Orion's girdle. It may assist the alignment of the vicinity to state that the belt extends exactly 3°, or 1½° on each side of this star. The galley-poet tells us:

> Our Lady's wand is bless'd by all who watch those gems on high,
> And centre of that brilliant zone *epsilon* meets the eye.

This beautiful constellation is a wonderful spot; and there is food for the theorist in the brilliant oblique zone exhibited by Taurus and Orion, coming to a full stop at Sirius.

["No nebulosity seen around A with $8\frac{1}{2}^{\text{in}}$ refractor, 1864."—*Brodie.*]

[The Parsonstown Observations are somewhat contradictory. In 1850 and 1852 a nebulosity appears to have been seen; but in 1874 and 1878 it is emphatically stated that none was seen.]

355. 158 B. ORIONIS. (Σ. 754.)

	h.	m.	s.			s.
R. A.	**5**	**31**	**14**	Prec.	+	2·93
		°	′			″
Decl.	**S**	**6**	**8·4**	——	N	2·51

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	287·6	...	5·1	...	1830·09

A double star. A 7, white; B 10, blue.

356. 26 AURIGÆ. (Σ. 753.) CCXX.

	h.	m.	s.			s.
R. A.	**5**	**31**	**34**	Prec.	+	3·85
		°	′			″
Decl.	**N**	**30**	**25·6**	——	N	2·51

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	272·6	...	13·4	...	1782·68
Struve, W.	268·0	...	12·3	...	1828·61
Smyth	267·8	...	12·3	...	1833·09
Dunér	268·9	...	12·3	...	1870·15
Burnham A C	113·2	...	25·8	...	1877·87

A neat double star, on the Waggoner's left shin; where a line from the cluster in Orion's sword, led through the middle star of the belt, through ζ Tauri, will hit it at less than 10° beyond the latter. A 5, pale white; and B 8, violet. A fine object. [The mag. of Burnham's C is 11·5. A is yellow according to Knott. 3° *nf* β Tauri.]

357. 757 Σ. ORIONIS.

	h.	m.	s.			s.
R. A.	**5**	**32**	**27**	Prec.	+	3·06
		°	′			″
Decl.	**S**	**0**	**15·9**	——	N	2·45

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	239·8	...	1·68	...	1831·16
Stone, O.	238·6	...	1·76	...	1878·11

A double star. A $8\frac{1}{2}$, very white; B 9, very white. This pair is followed at a distance of 35^{s} by Σ. 758, the components of which are placed in Pos. 297°; Dist. 11″; Epoch 1831·67, and are of mags. 9 and $9\frac{1}{2}$, and both white.

358. 124 TAURI. (BC = Σ. 755.) CCXXI.

		h.	m.	s.			s.
R. A.		5	32	34	Prec.	+	3·64
		°	′				″
Decl.	N	23	15·5		——	N	2·41

		Position.	Distance.	Epoch.
		°	″	
Struve	B C	315·7	5·9	1830·55
Burnham	A B	214·8	145·7	1879·85
	B C	315·1	5·6	
	A D	175·7	79·0	

A coarse quadruple star, in the space over the Bull's southern horn. A 8½, garnet; B 8, and C 9, both pale white, and forming a very delicate object; D 10, bluish. This star does not appear in the British *Catalogue*, but was well observed by Piazzi, who remarked, "Præcedit telescopica ad Austrum, nec alia inventa." This group was examined because it happened to be near the spot where I was on the look-out for Halley's comet, on its most welcome return to our neighbourhood, in August, 1835.

124 Tauri is rather more than one-third of the distance from α Tauri to α Geminorum; and about 2° N., very slightly following ζ on the tip of the right horn.

359. σ ORIONIS. (Σ. 761 and 762.) CCXXII.

		h.	m.	s.			s.
R. A.		5	33	3	Prec.	+	3·01
		°	′				″
Decl.	S	2	38·0		——	N	2·30

		Position.	Distance.	Epoch.
		°	″	
Smyth	A a	235·9	12	1832·20
	A B	84·2	12·5	
	A C	60·8	41·8	
	A D	321·6	211·5	
	D E	266·8	8·5	
	D F	21·8	67·8	
Main	A B	84·3	12·7	1863·07
	A C	61·2	41·6	

A multiple star, just below the belt of Orion, forming a scalene triangle with ζ and ε. A 4, bright white; a 11, ash-coloured; B 8, bluish; C 7, grape red; D 8½, dusky; E 9, white; F 8, pale grey. This is a fine group of 10 members, forming 10 and 11 H. II., where it is denominated "a double-treble star, or two sets of treble stars almost similarly situated;" H. and S. call it "a very pretty double-triple star:" but Professor Barlow, with greater precision, says it is "double-quadruple, with two very fine stars between the sets."

As this is a good object for trying the light and definition of a telescope, and the following of its groups is both delicate and pretty as a quadruple set, the explorer is recommended to examine it when in apparition. Nor need he be very much annoyed with his instrument should he be unable to distinguish the minute *comes* a; since it is so small a point of light, that it escaped ever the searching eye of H.

This group may be readily fished up, as it forms the southern vertex of a triangle with the 2 last stars in the belt, as above stated; and it is rather less than a degree from ζ, in the direction of β.

[Smyth's measures are all in close agreement with those of H. (1779), J. Herschel and South (1823), and Σ. (1831).]

360. 45 LEPORIS. (*h. 3780.)

R. A.	**5h.**	**34m.**	**25s.**	Prec.	+ 2·64s.
Decl.	**S**	**17°**	**56′·6**	——	N 2″·21

		Position.	Distance.	Epoch.
		°	″	
Dembowski	A B	136·0	89·4	1876·59
	A C	6·2	76·2	
	A D	298	126·4	
Burnham	A E	48·7	60·3	1878 &c.
	A F	310·4	41·8	
	A a	137·8	0·93	
	B b	359·7	1·50	
	B G	31·8	51·3	

Described by Sir J. Herschel as quintuple, mags. 7, 7, 8, 8, 8. He gave no measures, and the above R. A. &c. only as rough. These particulars, imperfect as they are, excited the attention of Burnham, who examined the group with care. "The group was found to consist really of 6 stars, 2 of them being quite small. The star E is probably the one not noticed by Herschel. The relative places of these stars are given with rough measurements. The star B was at once perceived to have a near companion, and the principal star, A, suspected to be a very close pair, but was not satisfactorily verified until some nights later. The latter is very difficult with my aperture, and the other by no means easily seen under ordinary atmospheric conditions. Taken together the group is a very interesting one. The large stars, A, B, C, and D, are respectively 10726, 19728, 10727 and 10725 of Lalande. The system is just visible to the naked eye, and shown on Heis's Star Atlas as 6·7 mag. It is 6m 35s exactly following α Leporis." Later observations have led Burnham to assign magnitudes as follows:—A 6·8; a 8·3; B 9·3; b 9·7; C 8; D 8·5; E 8·5; F 13; G 10.

361. ζ ORIONIS. (Σ. 774.) CCXXIII.

R. A.	5h 35m 12s	Prec.	+ 3s·02
Decl.	S 2° 0′·2	——	N 2″·14

		Position.	Distance.	Epoch.
Herschel, J., and South	A B	150°·0	2″·62	1822·61
Struve, W.	A B	151·3	2·35	1831·22
Smyth	A B	148·8	2·5	1839·19
	A C	7·8	56·0	
Fletcher	A B	149·6	2·64	1851·11
Jedrzejewicz	A B	152·1	2·61	1878·17
Burnham	A C	9·1	57·1	1879·17

A fine triple star, the last or lowest on Orion's belt, formerly one of the *Nautical Almanac* List, but rejected in 1830. A 3, topaz yellow, and very bright for its magnitude; B 6½, light purple; and C 10, grey. The principal star is designated on Piazzi's and other *Catalogues*, Alnitak, the Arabian *al-niṭák*, the girdle; otherwise in conjunction with δ and ϵ, *Minṭakah al-jaúzá*, the giant's belt.

Presumably H., in 1780, could not have seen the large star double; and yet it seemed difficult to account for his overlooking so remarkable and elegant a pair, wherefore it has been surmised that the *comes* was under occultation at the time. Later observations do not countenance this singular idea.

[Gledhill considers that the angle of A B is slowly increasing, but the evidence is not very conclusive, it seems to me.]

362. 219 (?) Dunlop DORADÛS. (h. 2913; H. 1235.)

R. A.	5h 35m 36s	Prec.	− 0s·16
Decl.	S 67° 38′·7	——	N 2″·13

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; E; 2nd of 3;" which means:—"bright; large; extended; the 2nd of 3 nebulæ." The other 2 nebulæ are both marked as bright and large: and precedes H. 1235 by 20^{s}; the other follows it by 13^{s}. Engraved, *Cape Obs.*, Pl. iii. Fig 5.

363. 34 H. IV. ORIONIS. (h. 365; H. 1225; R.) CCXXIV.

R. A.	5h 36m 5s	Prec.	+ 3s·28
Decl.	N 9° 2′·0	——	N 2″·09

A planetary nebula, of a bluish white tint, on the nape of Orion's neck; and about 3½° on the line from *a* towards the three small stars forming Orion's head. This is a small and pale, but very distinct object, with a faint disc: it is described by H. as "rather oval, and perhaps of a mottled light:" a power of vision beyond what my means afforded. [The adjective "planetary" is not applied to this object in the *Parsonstown Observations*, but it is twice mentioned as suspected to be a "globular cluster."] It is preceded by several small stars, the foremost of which is coarsely double, and of the 8th and 10th magnitudes.

[Engraved, D'Arrest, *Dissertation*, Pl. ii. Fig. 2; Lassell, *Mem. R. A. S.*, vol. xxiii. Pl. ii. Fig. 2.]

364. 3115 Σ. CAMELOPARDI.

	h. m. s.		s.
R. A.	**5 38 0**	Prec. +	5·64
Decl.	**N 62° 44′·2**	—— N	1″·92

	Position.	Distance.	Epoch.
Struve, W.	35°·5	1″·68	1831·63
Mädler	34·5	1·52	1845·92
Dembowski	28·4	1·48	1866·83
Struve, O.	28·3	1·37	1872·31

A double star. A 7, white; B 8, ashy white. Both the angle and the distance have evidently diminished.

365. 102 Dunlop HYDRI. (h. 2933; H. 1259.)

	h. m. s.		s.
R. A.	**5 38 7**	Prec. −	0·63
Decl.	**S 70° 13′·6**	—— N	1″·91

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; R; gb M; 3rd of 7;" which means:—"very bright; pretty large; round; gradually brighter in the middle; the 3rd of 7 nebulæ." These 7 nebulæ all have the same degree of declination, and are included within a limit of 2^m 10^s in R.A. Most of them are very faint.

Engraved, *Cape Obs.*, Pl. iv. Fig. 9.

366. 785 Σ. TAURI.

	h. m. s.		s.
R. A.	**5 39 5**	Prec. +	3·71
Decl.	**N 25° 52′·0**	—— N	1″·83

		Position.	Distance.	Epoch.
Struve, W.	A B	348°·6	13″·8	1830·74
Struve, O.	A C	66·4	18·3	1846·04

A triple star. A 7, white; B. 8, bluish white; C 12. AC = O Σ 116.

367. 30 DORADÛS. (h. 2941; H. 1269.)

	h.	m.	s.			s.
R. A.	5	39	29	Prec.	—	0·42
		°	′			″
Decl.	S	69	9·4	——	N	1·79

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!!; vB; vL; looped;" which means:—"an extremely remarkable object; very bright; very large; in the form of a loop."

Engraved, *Cape Obs.*, Pl. ii. Fig. 4.

368. 2007 Lac. HYDRI. (*h. 3796.)

	h.	m.	s.			s.
R. A.	5	39	34	Prec.	—	0·43
		°	′			″
Decl.	S	69	8·8	——	N	1·78

		Position.		Distance.		Epoch.
		°		″		
Herschel, J.	A B	180 ±	...	9 ±	...	1835 ±
	A C	304	...	12 ±		
	A D	44	...	12 ±		
	A E	359	...	18 ±		
	A F	44	...	20 ±		
	A G	132	...	25 ±		

A septuple star. Mags. 8½, 14, 13, 14, 13, 13, 12. A is the chief star in the centre of the great looped nebula in the Nubecula Major.

369. γ LEPORIS. CCXXV.

	h.	m.	s.			s.
R. A.	5	39	53	Prec.	+	2·52
		°	′			″
Decl.	S	22	28·7	——	N	1·62

		Position.		Distance.		Epoch.
		°		″		
Smyth	A B	349·0	...	92·9	...	1832·06
	B C	345·0	...	45		

A wide triple star, in a barren field, in the Hare's left hind foot; where a line passed from δ Orionis, the preceding star of the belt, through the sword cluster, and carried 16° beyond, hits upon it. A [3½], light yellow; B 6½, pale green; C 13, dusky; and a fourth star, of the 12th magnitude, follows at Δ R.A. = 21^s. This poor object was only examined because, under 50 Ħ. V., we are told there is a companion within 40′ of A, of course meaning forty seconds. This escaped my search; but on the whole, though γ Leporis is of a fine lustre, I have little doubt of B and C being the stars which Ħ. classed.

370. 780 Σ. CAMELOPARDI.

		h.	m.	s.			s.
R. A.		5	39	58	Prec.	+	6·01
Decl.	N		65°	43′·0	——	N	1″·75

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	103·5	3·7	1831·79
	154·8	10·9	1831·60

A triple star. A 7, yellow; B 8½, blue; C 12.

371. 187 B. ORIONIS. (Σ. 790.)

		h.	m.	s.			s.
R. A.		5	40	36	Prec.	+	2·97
Decl.	S		4°	18′·2	——	N	1″·70

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	89·0	6·8	1830·84
Stone, O.	87·7	6·6	1877·95

A double star. A 7½, reddish yellow; B 10, blue.

372. 78 M. ORIONIS. (h. 368; H. 1267; Ɍ.) CCXXVI.

		h.	m.	s.			s.
R. A.		5	41	6	Prec.	+	3·07
Decl.	N		0°	2′·1	——	N	1″·55

		Position.	Distance.	Epoch.
		°	″	
Burnham	A B	22·2	50·8	1880·03
	B C	85·3	1·74	1878·12

Two stars in a "wispy" nebula, just above Orion's left hip; where a ray from β carried between the centre and last stars of the belt, and extended 2° farther, picks it up. A 8½, and B 9, both white; [C 11·5]. This object was found by Messier in 1780, and described as "two bright nuclei surrounded by nebulosity." It is a singular mass of matter trending from a well-defined northern disc into the *sf* quadrant, where it melts away. The nebula lies equatorially between two small stars, which are nearly equidistant from it, in a blankish part of the heavens; and in its most compressed portion is the wide double star.

["Very faint but curious."—*Brodie.*]

["The southern star rather the brighter."—*Knott.*]

[Burnham found B double. It is No. 559 of his lists.]

[Engraved in *Phil. Trans.*, 1833, Pl. iv. Fig. 36; Rosse, woodcut, *Phil. Trans.*, 1861; Rosse, Dublin *Trans.*, 1879, Pl. i. Fig. 1267.]

373. 52 ORIONIS. (Σ. 795.) CCXXVII.

	h. m. s.		s
R. A.	5 42 6	Prec. +	3·22
Decl.	N 6° 25′·0	—— N	1″·52

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	200·3	...	1·00 ±	...	1781·76
STRUVE, W.	200·0	...	1·75	...	1831·23
SMYTH	199·9	...	1·8	...	1838·27
KNOTT	198·9	...	1·6	...	1863·06

A close double star, on Orion's left shoulder; about 2° S.W. of *a*. A 6, pale white; B 6½, yellowish. This very elegant object may perhaps be altering both in position and distance.

374. 225 P. V. AURIGÆ. (Σ. 796.) CCXXVIII.

	h. m. s.		s.
R. A.	5 42 45	Prec. +	3·89
Decl.	N 31° 45′·0	—— N	1″·52

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	61·1	...	3·6	...	1830·79
SMYTH	61·5	...	3·8	...	1832·00
WILSON, &c.	63·1	...	3·7	...	1874·13

A very neat double star, on the Waggoner's left shin; lying in the line formed between *β* Aurigæ and *δ* Orionis, the preceding star in Orion's belt; nearly in mid-distance between *β* and the three small stars forming Orion's head. A [7½], creamy white; B 8½, pale grey.

375. 594 Dunlop COLUMBÆ. (h. 2944; H. 1288.)

	h. m. s.		s.
R. A.	5 43 1	Prec. +	2·16
Decl.	S 34° 17′·6	—— N	1″·47

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864 :—"⊕; B; p L; i R; gb M;" which means :—"a globular cluster; bright; pretty large; of an irregular round form; gradually brighter in the middle."

376. 37 M. AURIGÆ. (h. 369; H. 1295; ℞.) CCXXX.

	h. °	m. ′	s.		s. ″
R. A.	5	45	2	Prec. +	3·92
Decl.	N 32	31·3		——— N	1·32

	Position.	Distance.	Epoch.
Burnham	345°·8	17″·4	1879·85

A double star in a cluster in front of Auriga's left shin. A and B, both of the 10th magnitude, and pale yellow. A magnificent object, the whole field being strewed as it were with sparkling gold-dust; and the group is resolveable into about 500 stars, from the 10th to the 14th magnitudes, besides the outliers. Messier described it as "a mass of small stars, much enveloped in nebulous matter." This nebulous matter, however, yields to my telescope, and resolves into infinitely minute points of lucid light, among the distinct little individuals. It is immediately preceded on the parallel by another small double star: and is about ½° N.E. of 225 P.V. Aurigæ.

["Even in smaller instruments extremely beautiful, one of the finest of its class. Gaze at it well and long."—*Webb.*]

["Wonderful loops and curved lines of stars, as also remarked by D'Arrest."—*Parsonstown Obs.*]

377. 809 Σ. ORIONIS.

	h. °	m. ′	s.		s. ″
R. A.	5	45	3	Prec. +	3·04
Decl.	S 1	27·6		——— N	1·30

	Position.	Distance.	Epoch.
Struve, W.	101°·2	25″·7	1831·16
Burnham	98·3	25·2	1879·02

A double star. A 8, yellow; B 9, ashy.

378. 816 Σ. ORIONIS.

	h. °	m. ′	s.		s. ″
R. A.	5	49	2	Prec. +	3·21
Decl.	N 5	50·1		——— N	0·96

	Position.	Distance.	Epoch.
Struve, W.	289°·3	4″·2	1830·13

A double star. A 6½, very white; B 9.

379. α ORIONIS. CCXXXI.

R.A.	5h 49m 13s	Prec. + 3s·24
Decl.	N 7° 23′·0	—— N 0″·93

	Position.		Distance.		Epoch.
Herschel, W.	152°·3	...	161″	...	1780·78
Smyth	155	...	160	...	1832·75

A *Nautical Almanac* star, with a distant *comes*, on Orion's left shoulder. A 1, orange tinge; B 11, bluish, and the two point nearly upon a pale small star in the *np* quadrant, at Δ R.A. 15·7s. [Others nearer.—*Burnham.*]

It is called Betelgeuze, from *ibṭ-al-jauzá*, the giant's *axilla*, or shoulder, whence it is also *menkib-al-jauzá;* and it has likewise been designated *al-mirzam*, the roarer. It is the northernmost of the 4 bright stars forming the *corners* of this constellation, and cannot be mistaken by the most casual observer: moreover, with Sirius and Procyon, it forms a conspicuous triangle, which is nearly equilateral; while Procyon makes a right-angled one with Betelgeuze and Pollux. It is hardly necessary to diagram this well-known and splendid group.

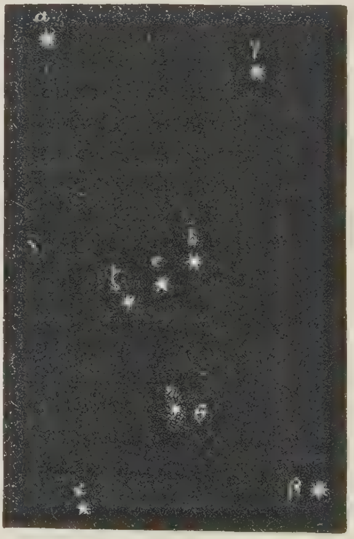

Fig. 10. Orion.

H. pointed out this fine star as being variable and periodic: on his star-list the maximum was stated as above β Orionis, the minimum below α Tauri. [Fletcher in 1852 confirmed Herschel, but J. F. J. Schmidt pronounces strongly against the idea of variability. "A most beautiful and brilliant gem! singularly beautiful in colour, a rich topaz; in hue and brilliancy different from any other star I have seen."—*Lassell.* "Look at α and β alternately; even a small telescope will show the beauty of the contrast."—*Webb.*]

Orion may be considered the most beautiful and brilliant of all the constellations without disparaging the Great Bear; and when just over our meridian is so well accompanied, as to present the finest view of the heavens in this hemisphere. The principal stars of Orion, when joined by imaginary lines, form two inverted cones, and resemble a clepsydra, or hour-glass. He is usually represented as a classic warrior; but Paulus Venetus, *De compositione Mundi*, equips him in knightly armour, with a huge club in one hand, a formidable human-faced shield in the other, and a long Toledo sword by his side: and this is also the style in which he figures among the illustrations to Julius Firmicus in 1497. As the ecliptic passes nearly through its middle, it is visible to all the world; while its figure, belt, and pendant sword, so well described by Manilius, render it of easy recognition.

No constellation was more noted among the ancients than Orion. As it occupies an extensive space in the heavens, this circumstance may have probably given Pindar his notion that Orion was of a monstrously large size; and hence the *jugula* of Plautus, the *magni pars maxima cœli* of Manilius, and the *jebbër* of the Arabians. Hood tells us that "the reason why this fellow was placed in heaven," was to teach men not to be too confident in their own strength. A disciple of the unhappy Lieutenant Brothers proposed to designate the whole asterism Nelson: and in 1807, the University of Leipzig resolved that the stars belonging to the belt and sword of Orion, as well as the intermediate ones, "shall in future be called the constellation NAPOLEON." Was that learned body in possession of a copy of Thomas Hood's treatise?

The present appellation, however, is of too long a standing, and has too firm a hold on men's minds, to be easily shaken; and, despite of his origin, it seems "this fellow" must stand. Both the Septuagint and the Vulgate call it Orion, according to the Greeks and Romans. It is mentioned in Job, Ezekiel, and Amos; and the Mosaicists persist that it represented Nimrod, as mighty a hunter as Orion, and the author of the post-diluvian heresy[a]. From his terrible and threatening gesture, as much as from his time of rising, he was held to portend tempests and misfortune, and was therefore so much dreaded by the mariners of yore as to give rise to the ancient proverb "Fallit sæpissime nautas Orion." Polybius attributes the loss of the Roman fleet in the first Punic war to the obstinacy of the consuls, who, despite of the pilots, would sail between the risings of Orion and Sirius, always a squally time. The Latin writers are full of invective against *pluviosus et tristis* Orion; while the *nimbosus* of Virgil, the *nautis infestus* of Horace, the *aquosus* of Propertius, the *horridus sideribus* of Pliny, and the like sage allusions, fill the imagination with storms, hail, and deluges of rain.

This constellation is a rich mine for the practical astronomer, as containing a wondrous universe of bright stars, double stars, clusters, and nebulæ, within itself. The Capuchin De Rheita asserted that, with his binocular instrument, he found more than 2000 stars in it; and where he is not dwelling upon Teutonic crosses and seamless tunics, he will be found worthy of credit. The number of stars whose mean apparent places have been noted, are:

---

[a] Orion was designated *Khesîl*, or *Kesîl*, by the Hebrews, which the learned say comes from *chasel*, to be inconstant, to stir up, in allusion to the unsettled weather supposed to attend this constellation. Hence Rabelais has pleasantly called the grand Council of Trent the Council of Chesil, to denote that it was a stormy, fickle, and troublesome meeting. Has the Australian term of being *chiselled* any affinity with this?

Ptolemy	38 stars.	Bullialdus . . .	61 stars.
Ulugh Beigh . .	38 ,,	Hevelius	62 ,,
Tycho Brahé . .	62 ,,	Flamsteed . . .	78 ,,
Bayer	49 ,,	Bode	304 ,,

The reader of course will remember that the equinoctial circle cuts the middle of Orion; which is also about 8° W. of the solstitial colure, or *solis statio.* Nor will he forget the trimming which Halley gave Père Souciet about the Dodecatemorion of Aries, Newton's chronology, and the equinoctial colure.

380. β AURIGÆ. CCXXXII.

	h.	m.	s.			s.
R. A.	5	51	28	Prec.	+	4·40
Decl.	N	44°	56′·0	——	N	0″·75

	Position.		Distance.		Epoch.
	°		″		
Smyth	38·2	...	185·0	...	1837·70
Challis	37·9	...	183·4	...	1841·96
Burnham	38·7	...	184·0	...	1880·05

A bright star with a distant companion, on the Waggoner's left shoulder. A 2, lucid yellow; B 10½, bluish.

This fine star—familiarly known as Menkalinan, from the Arabic *Menkib-dhi-l'inán*, the rein-holder's shoulder—lost much of its importance on being rejected from the *Nautical Almanac* in 1830. It may be picked up by projecting an imaginary line from the Præsepe, in Cancer, through α Geminorum, which is nearly half-way: or a ray from β Orionis through γ Orionis, led rather more than three times as far to the N., hits it. Our friend the galley-rhymester submits a third alineation, thus:

> From the Pole-star direct a glance, with Betelgeuze to mix,
> About mid-distance, near the Goat, Menkalinan you'll fix:
> And there behold how neat it forms with Capra bright a base,
> While *delta* as a vertex stands, the triangle to grace

381. θ AURIGÆ. CCXXXIII.

	h.	m.	s.			s.
R. A.	5	52	12	Prec.	+	4·08
Decl.	N	37°	12′·4	——	N	0″·68

		Position.		Distance.		Epoch.
		°		″		
HERSCHEL, W.	A B	286·0	...	35·3	...	1782·68
STRUVE, O.	A B	5·5	...	2·15	...	1871·41
	A C	290·9	...	43·2	...	1852·12
	A D	350·3	...	125·1		
DEMBOWSKI	A C	292·4	...	45·2	...	1875·70
BURNHAM	A B	5·4	...	2·08	...	1878·60
	A C	292·7	...	45·5	...	1880·05

A triple star. A 4, brilliant lilac; B 7½; C 10, pale yellow; and lower down in the same quadrant, near the vertical, is D, a yellowish star of the 9th magnitude.

["There is some change from proper motion."—*Burnham.*]

382. 59 ORIONIS. CCXXXIV.

		h.	m.	s.			s.
R. A.		5	52	41	Prec.	+	3·11
			°	′			″
Decl.	N		1	49·5	——	N	0·62

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	205·0	...	37·2	...	1782·76
BURNHAM	205·8	...	36·5	...	1878·18

A small star, with a very minute companion, between Orion's left side and the Galaxy. A 6, white; B 13, blue. H. remarked that the small individual is "a point requiring some attention to be seen." A is preceded in the *np* quadrant by an 8th magnitude star, whose angle is about 290°, with a distance of 178″: this is 282 P. V.

59 Orionis may be picked up by a line shot from β through ζ, the third star of the belt, and carried nearly 6° beyond.

383. 26 H. VIII. GEMINORUM. (h. 372; H. 1325.)

		h.	m.	s.			s.
R. A.		5	54	24	Prec.	+	3·64
			°	′			″
Decl.	N		23	17·9	——	N	0·50

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"cl; pL; 40 or 50 st 8...15;" which means:—"a cluster; pretty large; it consists of 40 or 50 stars from the 8th to the 15th magnitude."

384. 35 CAMELOPARDI. CCXXXV.

		h.	m.	s.			s.
R. A.		5	55	45	Prec.	+	4·75
			°	′			″
Decl.	N		51	34·6	——	N	0·35

	Position.		Distance.		Epoch.
	°		″		
MÄDLER	12·50	...	39·9	...	1843·3
DEMBOWSKI	13·1	...	39·4	...	1867·0

A small double star, which, though absurdly chronicled in the Cameleopard, is in the Waggoner's eye; and it is nearly in the line between β and δ Aurigæ. A 7, white; B 10, lilac. H.'s magnitudes are 6½ and 11, with Pos. 13·8° and distance 35·0″. (Sweep 2292.)

385. 161 (?) Dunlop DORADÛS. (h. 3006; H. 1350.)

		h.	m.	s.			s.
R. A.		5	58	23	Prec.	−	0·45
		°	′				″
Decl.	S	69	11·9		——	N	0·14

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; S; R; vgvmb M; rr;" which means:—"a globular cluster; very bright; small; round; very gradually very much brighter in the middle; partially resolved—some stars visible."

386. 194 Dunlop DORADÛS. (h. 3011; H. 1356.)

		h.	m.	s.			s.
R. A.		5	59	30	Prec.	−	0·32
		°	′				″
Decl.	S	68	31·0		——	N	0·06

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; R; m CM; rr;" which means:—"globular cluster; very bright; round; much condensed in the middle; partially resolved—some stars visible."

387. 2145 Lac. PICTORIS.

		h.	m.	s.			s.
R. A.		6	1	57	Prec.	+	1·56
		°	′				″
Decl.	S	48	26·6		——	S	0·17

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	163·0 ...	3·8 ...	1835·57

A double star. A 8; B 8.

388. 35 M. GEMINORUM. (h. 377; H. 1360.) CCXXXVI.

		h.	m.	s.			s.
R. A.		6	2	4	Prec.	+	3·67
		°	′				″
Decl.	N	24	21·2		——	S	0·20

A cluster, near Castor's right foot, in the Galaxy, discovered by Messier in 1764. It presents a gorgeous field of stars from the 9th to the 16th magnitudes, but with the centre of the mass less rich than the rest. From the small stars being inclined to form curves of three or four, and often with a large one at the root of the curve, it somewhat reminds one of the bursting of a sky-rocket.

Under favourable circumstances this cluster can be distinguished by the naked eye. It must be sought on the line between Castor and ζ on the tip of the Bull's southern horn, at exactly one-quarter of the distance from the latter: or a line led from α Leporis through α Orionis, and extended 18° beyond, will strike upon it.

This object being so handy to the point assumed by Hipparchus, as the N. extreme of the ecliptic, I swept for anything which might be on the actual spot, under the necessary corrections, in R. A. 6h, and Decl. N 23° 27′. After some search, I found a star of the 12th magnitude, too small for any permanent purpose of reference.

389. 41 AURIGÆ. (Σ. 845.) CCXXXVII.

	h.	m.	s.		s.
R. A.	**6**	**3**	**10**	Prec. +	4·59
		°	′		″
Decl.	**N**	**48**	**44·0**	—— S	0·20

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	350·0	...	8·5	...	1782·85
Struve, W.	353·1	...	8·0	...	1830·31
Smyth	352·8	...	8·2	...	1837·97
Dunér	353·8	...	7·7	...	1872·46

A neat double star, in front of the Waggoner's chin; where a line from β Tauri, on the top of the Bull's northern horn, led through β Aurigæ, and carried 4° beyond, strikes upon it. A [6], silvery white; and B 7, pale violet. There appears no appreciable relative motion.

[" Relatively fixed, common proper motion: a remarkable though not infrequent phenomenon."—*Webb.*]

390. 855 Σ. ORIONIS.

	h.	m.	s.		s.
R. A.	**6**	**3**	**13**	Prec. +	3·13
		°	′		″
Decl.	**N**	**2**	**30·9**	—— S	0·28

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	113·2	...	29·3	...	1831·22

A double star. A 6, white; B 7, white.

391. 24 H̥. VIII. ORIONIS. (h. 379; H. 1361; Σ. 848.)

CCXXXVIII.

		h. m. s.		s.
R.A.		6 3 15	Prec. +	3·40
		° ′		″
Decl.	N	13 58·5	—— S	0·20

		Position.	Distance.	Epoch.
		°	″	
SOUTH	A C	109·5	2·75	1825·10
STRUVE, W.	A B	108.8	2·35	1833·19
DUNÉR	A B	110·4	2·2	1872·40
	A C	296·5	15·1	1872·2
BURNHAM	A C	295·4	15·5	1878·0

A close double star in a small cluster, on Orion's left hand. A 7½, and B 8½, both lucid white; [C 12]. This elegant little group has many glimpse stars thronging about the two lower angles. Enrolled by Σ. as *lucida acervi.*

These gatherings occurring indifferently upon the *Via Lactea* and off it, awaken still more our admiration of the stupendous richness of the Universe, in every department of which there appears such a profusion of creation, if we may so express ourselves of the works of the ALMIGHTY, in which our utmost ken has yet never detected any redundancy, much less anything made in vain.

392. 4 MONOCEROTIS.

		h. m. s.		s.
R.A.		6 3 15	Prec. +	2·7
		° ′		″
Decl.	S	11 8·3	—— S	0·26

		Position.	Distance.	Epoch.
		°	″	
DEMBOWSKI	A B	178·0	3·1	1875·9
	A C	244·5	8·9	1876·8

A triple star. A 6½; B 10½, blue; C 11. B was discovered by Burnham and C by Knott. A little *np* this object is 3 Monocerotis, found by Burnham to be double:—Pos. 354·8°; Dist. 1·62″; Epoch, 1875·9; mags. 6·8 and 10·5.

393. 859 Σ. ORIONIS.

		h. m. s.		s.
R.A.		6 3 43	Prec. +	3·20
		° ′		″
Decl.	N	5 40·8	—— S	0·33

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	249·0	...	31·4	...	1829·70
Mädler	248·6	...	32·0	...	1845·19
Engelmann	248·4	...	34·0	...	1863·17
Burnham	246·7	...	34·4	...	1879·00

A double star. A 8½, yellowish; B 9, white. An increase in distance seems implied by the above measures, if they can be depended upon. "The change is probably due to proper motion."—*Burnham.*

394. 135 Birm. GEMINORUM.

	h. m. s.		s.
R. A.	6 4 3	Prec. +	3·72
	° ′		″
Decl.	N 26 2·3	——	S 0·35

A red star of mag. 7½. Schwerd, "röthlich," 6; Webb, 1872, "fine ruby colour;" Birmingham, 1873, "very red," 7½; 1875, "fine deep red," 8.

395. 25 H. VII. ORIONIS. (h. 3804; H. 1376; R.) CCXXXIX.

	h. m. s.		s.
R. A.	6 6 15	Prec. +	3·20
	° ′		″
Decl.	N 5 28·6	——	S 0·55

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	358·5	...	5 ±	...	1830
Smyth	355	...	5	...	1833·00

A neat but minute double star, in a cluster, under Orion's left shoulder and in an outcropping of the Galaxy. A 9½ and B 10, both pale yellow. This is a tolerably rich and compressed mass of stars, from the 9th to the 16th magnitudes, with numerous stragglers.

To fish up this object, pass a line from β Orionis through the lower star of Orion's belt, and carry it a little more than as far again to the N.E., where it will strike the cluster at about 4° S.E. of α Orionis.

396. 872 Σ. AURIGÆ.

	h. m. s.		s.
R. A.	6 8 15	Prec. +	4·05
	° ′		″
Decl.	N 36 10·5	——	S 0·71

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	217·3	...	11·0	...	1828·94
Dunér	217·5	...	11·0	...	1868·49

A double star. A 6, white; B 7½, white. The fixity of the components is established beyond a doubt.

397. 5 MONOCEROTIS.

	h.	m.	s.			s.
R. A.	6	9	30	Prec.	+	2·93
		°	′			″
Decl.	S	6	14·4	——	S	0·83

"A fine orange star" of mag. 4½. Webb is the authority for the colour, but the star appears in Birmingham's *Catalogue* (No. 140).

398. 1201 Brisb. DORADÛS.

	h.	m.	s.			s.
R. A.	6	11	54	Prec.	+	0·14
		°	′			″
Decl.	S	65	30·3	——	S	1·04

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	114·9	21·5	1836·20

A double star. A 7½; B 8½.

399. 4 LYNCIS. (Σ. 881.) CCXL.

	h.	m.	s.			s.
R. A.	6	12	17	Prec.	+	5·33
		°	′			″
Decl.	N	59	25·1	——	S	1·10

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	88·9	0·81	1830·28
SMYTH	90·2	1·0	1837·89
STRUVE, O.	95·6	0·87	1847·52

A close double star, in the animal's snout; at about 30° from Polaris, on a line through Sirius, and closely N.E. of 2 Lyncis. A 6 and B 7½, both white. This elegant but difficult object was discovered by Σ., and is one of his *vicinæ.*

The above measures imply a direct movement in angle; but the pair is too impracticable to merit reliance on epochs of short periods. It is only from accurate and continued observations that an orbit worthy of confidence will emerge.

The Lynx, *seu Tigris,* is one of the new asterisms formed by Hevelius, from the *stellæ informes* of the neighbourhood, and added to the old 48 constellations. It is pretty extensive, occupying a vast space between Auriga and the Greater Bear, above the Twins; but though it contains many beauties for assisted vision, there are few remarkable objects to the naked eye. Hevelius started it with 19 stars, Flamsteed gave it 44, and Bode 149.

Hevelius defends the location he has assigned to this animal, and in a set paragraph, *De Loco Lyncis*, tells us that he cast it between the Great Bear and Auriga, where an empty space was found on the globes, which was wont to be filled up with title and dedication. He acknowledges that the 19 components he assigned it are small and insignificant, but thinks that those who would examine the Lynx ought to be lynx-eyed. He formed a symbol for this, as well as for the other asterisms, giving permission to those carpers who dislike them to make new ones if they choose: "Si cuidam Momo forte displicent, liberum ipsi per me esto, alios characteres effingere."

400. 58 P. VI. MONOCEROTIS. (Σ. 891.) CCXLI.

		h.	m.	s.			s.
R. A.		6	14	31	Prec.	+	3·36
			°	′			″
Decl.	N		12	20·2	——	S	1·28

	Position. °		Distance. ″		Epoch.
Struve, W.	292·4	...	21·9	...	1830·33
Gledhill	295·0	...	20·8	...	1874·2

A most delicate double star, close to Orion's left hand, and in the Galaxy. A 8 and B [11], both dull yellow; followed at about 10s by a coarse pair, of the 9th and 10th magnitudes, which constitute the No. 892, rejected from Σ.'s list. The object is only *estimated.*

Here is another of those cases where illumination is out of the question; but the rock-crystal micrometer enabled me to catch up a tolerably fair angle. The instrument is easily managed after practice.

This star, though placed on the Unicorn's horn by various map-makers, is filched from Orion, and in the S.D.U.K. Map is placed on that gentleman's club; so that in any reform of the heavens, the matter must be gravely looked to.

A line from β Orionis through ε, in the middle of Orion's belt, passed under α on his left shoulder, and extended 7½° beyond, will strike upon the little star in question.

401. μ GEMINORUM. CCXLIII.

		h.	m.	s.			s.
R. A.		6	16	18	Prec.	+	3·62
			°	′			″
Decl.	N		22	34·5	——	S	1·42

	Position. °		Distance. ″		Epoch.
Burnham	76·7	...	72·3	...	1880·03

A *Nautical Almanac* star of 1830, with a distant *comes*, on Castor's right instep; a glance from Orion's sword cluster through ζ the lowest of the belt, carried closely to the E. of *a*, and 16° beyond, will rest upon μ. A 3, crocus yellow; B 11 [or less—*Knott*], bluish; there are two other companions in the *sf*, and a group of small stars follow at Δ R. A. $=25^{s}$. This object is known as Tejat *post*, from *Taḥyáh*, a word used by the Arabs, as the name of a constellation formed by the two stars η and μ, in the anterior feet of Gemini.

["Tint of A very fine. B very small, $5\frac{1}{2}^{in}$, 1863."—*Webb.*]

402. 5 LYNCIS. CCXLII.

	h.	m.	s.			s.
R. A.	**6**	**17**	**12**	Prec.	+	5·25
	°	′				″
Decl.	**N 58**	**28·7**		——	S	1·40

		Position.		Distance.		Epoch.
		°		″		
HERSCHEL, W.	A C	272·0	...	88·3	...	1782·87
SOUTH	A C	272·1	...	95·4	...	1825·05
BURNHAM	A B	139·1	...	30·3	...	1879·86
	A C	272·5	...	95·9		

A coarse triple star, on the animal's lower jaw; it is a little to the N. of a line running from *a* Auriga towards *a* Ursæ Majoris, and about 18° from the former star, where it precedes 6 Lyncis. A 6, orange tinge; B [11], blue; and C 9, pale garnet. H. overlooked B.

Sir J. Herschel, in his Notes, alludes to the difference in distance between his father's measures and more recent ones, saying, "It may be remarked once for all, that there is great reason to suspect a considerable instrumental error in all the measures of that early period, exceeding 40″, the result being constantly (or most commonly) in defect, and that not unfrequently to a very large amount. The cause probably lies in the construction of the micrometer used; and its effect is to throw a great uncertainty on the earlier distances of all stars of the Fifth and Sixth Classes. Fortunately these are the least replete with interest." Here, however, my friend's opinion,—and with the utmost deference be it said,—is, like one of Homer's prayers, only to be in part received.

403. β CANIS MAJORIS. CCXLVI.

	h.	m.	s.			s.
R. A.	**6**	**17**	**52**	Prec.	+	2·64
	°	′				″
Decl.	**S 17**	**54·2**		——	S	1·61

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	339·1	...	185·2	...	1879·91

A bright star with a distant companion, on the Dog's fore-paw.

A 2½, fine white; B 9, dusky grey, and another of the same magnitude in the *sp* quadrant.

β Canis Majoris is called Mirzam, the roarer, a term applied to the camel as well as the lion. *Al-mirzam* is the name of this star, of β in Canis Minor, and of γ and α in Orion; the two former being called *al-mirzamáni*, the two roarers.

A line dropped from β Tauri, on the northern horn of the Bull, to α Orionis, and from thence nearly the same distance to the S., will fall upon the star under discussion.

Where Sirius blazes in the south, and leaves the ship behind,
Look west-south-west, just four degrees, and *beta* there you'll find.

404. 8 MONOCEROTIS. (Σ. 900.) CCXLV.

	h.	m.	s.		s.
R. A.	**6**	**17**	**56**	Prec. +	3·18
		°	′		″
Decl.	**N**	**4**	**38·8**	—— S	1·59

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	25·3	...	14·3	...	1823·04
Struve, W.	25·8	...	13·8	...	1831·74
Main	24·3	...	12·9	...	1868·21
Jedrzejewicz	25·8	...	13·9	...	1880·19

A neat double star, in the Unicorn's nostril; where a glance from α Tauri, passed closely over the head and shoulders of Orion, will find it at about 7½° E. of α. A [4½], golden yellow; B [7], lilac. A fine object.

[" Glorious low-power field."—*Webb*.]

405. 15 GEMINORUM. CCXLVII.

	h.	m.	s.		s.
R. A.	**6**	**21**	**13**	Prec. +	3·58
		°	′		″
Decl.	**N**	**20**	**51·5**	—— S	1·95

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	210·0	...	32·6	...	1782·08
Herschel, J., and South	204·6	...	32·6	...	1822·10
Smyth	205·4	...	33·2	...	1832·04
Main	205·5	...	31·0	...	1863·07

A fine double star, on Castor's right heel; very nearly in mid-distance of an imaginary line between α Geminorum and γ Orionis, where it is the northern member of a trapezium of small stars. A 6, flushed white; B 8, bluish. This object was classed twice over by Sir William Herschel, being 52 and 56 H. V.

406. — CANIS MAJORIS. (*h. 3858.)

	h. m. s.		s.
R. A.	6 21 44	Prec. +	2·17
Decl.	S 34° 57′·9	—— S	1″·90

	Position.	Distance.	Epoch.
Herschel, J.	313°·8	3″ *est.*	1836·02
Santiago Obs.	67·3	6·7	1852·19

A double star. A 7½; B 8. Sir J. Herschel calls this a "fine object," and remarks that a 6th mag. star precedes it to the S.

The Declination above is as corrected by the Santiago observers. The *Cape Obs.* put it at 33°.

407. 104 P. VI. MONOCEROTIS. (Σ. 910.) CCXLVIII.

	h. m. s.		s.
R. A.	6 22 4	Prec. +	3·08
Decl.	N 0° 31′·0	—— S	1″·98

		Position.	Distance.	Epoch.
Struve, W.	A B	150°·5	66″·1	1831·68
	B C	168·8	0·78	1825·12
Smyth	A B	151·5	67·8	1833·14
	B C	170·0	0·6	
Dembowski	B C	165·6	0·7	1869·1
Burnham	B C	162·5	0·93	1878·2

A coarsely triple star, between the boundary line of Orion and the Unicorn's chest; it is about 17° from Procyon, on a ray carried to the W.S.W. through Orion's sword cluster and *β* Orionis. A 7½, topaz yellow; B and C 8½, both of a plum tinge. B is most exquisitely double.

["A low-power field includes 77, a fine 6th mag. yellow star, with this pair *np*, and another *sp*: a noble spectacle."—*Webb.*]

408. 10 MONOCEROTIS. CCXLIX.

	h. m. s.		s.
R. A.	6 22 31	Prec. +	2·96
Decl.	S 4° 41′·9	—— S	2″·05

		Position.	Distance.	Epoch.
Burnham	A B	256°·4	76″·9	1879·88
	A C	231·0	80·6	

A wide double star in an elegant group [=25 H. VIII; H. 1415], on the Unicorn's right fore-knee: it is about 12½° in an occult line carried from Sirius a little to the W. of *a* Aurigæ, and directly between *β* in the Lesser Dog and *a* Leporis. A 6, pale yellow; B 9, orange, with a *comes* to the S. Though this object is a capital one for testing the performance of a telescope, it has not been classed among the clusters.

Monoceros was introduced into the firmament by Bartschius, among the delineations on his 4ft globe; it was, perhaps out of regard to the husband of Kepler's daughter, retained by Hevelius, being now considered as one of his constellations. It is concocted of the *stellæ informes* scattered about in the large space between Orion, Hydra, and the two Dogs, over a portion of the Milky Way. But though extensive it is not conspicuous, few of its gems rising to the 4th magnitude. It has been pretty well ransacked since its first appearance in the *Prodromus Astronomiæ*, and many capital pairs, nebulæ, and clusters have been reaped. The stars have been thus successively tabulated:

Hevelius	19 stars.	Piazzi	95 stars.
Flamsteed	31 „	Bode	220 „

409. 9 H. VIII. GEMINORUM. (h. 389; H. 1417; R.)

	h.	m.	s.			s.
R. A.	6	22	57	Prec.	+	3·47
		°	′			″
Decl.	N	16	45·5	——	S	2·00

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; e L; p R i; l C; st L & S;" which means:—"a cluster; exceedingly large; pretty rich; little condensed; its stars are large and small —various sizes."

410. 11 MONOCEROTIS. (Σ. 919.) CCL.

	h.	m.	s.			s.
R. A.	6	23	29	Prec.	+	2·91
		°	′			″
Decl.	S	6	57·7	——	S	2·10

		Position.		Distance.		Epoch.
		°		″		
Smyth	A B	130·3	...	7·2	...	1834·02
	A C	121·6	...	9·6		
	B C	102·3	...	2·8		
Dunér	A B	132·3	...	7·2	...	1870·91
	B C	105·0	...	2·3	...	1871·24
Burnham	A D	56·1	...	25·8	...	1878.00
Jedrzejewicz	B C	104·4	...	2·7	...	1880·20

A fine triple star, in the Unicorn's right fore-leg: a ray shot from the Bull's eye through γ Orionis, and extended rather more than as far again into the S.E., will pick it up in the out-cropping of the Milky Way. A 6½, white; B 7; C 8, both white; [D 13]. H., who discovered this in 1781, classed it as a "curious treble star," and pronounced it to be "one of the most beautiful sights in the heavens;" but the next observers, his son and Sir J. South, registered it quadruple. The several measures are so coincident, on comparison—notwithstanding that the nearness of magnitudes creates an anomaly of quadrants—as to prove the general fixity of the individuals.

[" Notwithstanding the striking appearance of connection, motion has not been detected here."—*Webb.*]

411. 921 Σ. GEMINORUM.

	h.	m.	s.		s.
R. A.	6	25	2	Prec. +	3·34
	°	′			″
Decl.	N 11	19·9		—— S	2·27

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	3·8	...	16·2	...	1831·38
Dawes	4·3	...	16·3	...	1848·16

A double star. A 6¼, yellowish white; B 9, bluish white. On the borders of Gemini and Monoceros.

412. 2 ♅. VII. MONOCEROTIS. (H. 1424; Ɍ.) CCLI.

	h.	m.	s.		s.
R. A.	6	25	4	Prec. +	3·19
	°	′			″
Decl.	N 5	1·3		—— S	2·34

A tolerably compressed cluster, between the Unicorn's fore legs. This is a brilliant gathering of large and small stars, from the 7th to the 14th magnitudes; the latter running in rays. It may be found nearly in mid-distance between β Geminorum and α Leporis, where it is crossed by a line led from Procyon to the W., and passed between Orion's belt and his right shoulder, about 2° below γ Orionis.

[The yellow 7th mag. star is 12 Monocerotis.]

[" Beautiful; visible to the naked eye." – *Webb.*]

413. 229 B. AURIGÆ. (Σ. 918.)

	h.	m.	s.		s.
R. A.	6	25	10	Prec. +	4·81
	°	′			″
Decl.	N 52	33·0		—— S	2·20

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	322·4	...	4·4	...	1829·26
Mädler	325·1	...	4·7	...	1843·26
Mädler	323·9	...	4·4	...	1852·28
Engelmann	325·3	...	4·8	...	1865·46
Jedrzejewicz	325·9	...	4·4	...	1879·28

A double star. A 7, white; B 8½, white.

414. 616 (?) Dunlop CANIS MAJORIS. (h. 3053; H. 1423.)

	h.	m.	s.			s.
R. A.	6	25	22	Prec.	+	2·27
		°	′			″
Decl.	S	31	12·5	—	S	2·22

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"pB; cL; R; vlgbM; 4′;" which means:—"pretty bright; considerably large; round; very little brighter in the middle; 4′ in diameter."

415. 20 GEMINORUM. (Σ. 924.) CCLII.

	h.	m.	s.			s.
R. A.	6	25	52	Prec.	+	3·50
		°	′			″
Decl.	N	17	51·4	—	S	2·34

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	208·9	19·4	1822·05
STRUVE, W.	209·8	20·0	1830·00
SMYTH	209·2	20·4	1833·99
WILSON and SEABROKE	210·1	20·1	1874·13
JEDRZEJEWICZ	209·7	20·0	1878·66

A neat double star, on Castor's left heel, about 1½° to the N.N.W. of the bright star γ Geminorum; where a line carried from β Orionis over the middle component of Orion's belt will point it out at about 14° beyond α Orionis. A 8, topaz yellow; B 8½, cerulean blue. [In a fine field.]

This is a very fine object. No appreciable change has occurred in 56 years.

416. 3 H. VIII. MONOCEROTIS. (h. 395; H. 1429.)

	h.	m.	s.			s.
R. A.	6	28	46	Prec.	+	3·27
		°	′			″
Decl.	N	8	26·5	—	S	2·51

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vL; E; Ri; lC;" which means:—"a cluster; very large; extended; rich; little condensed."

417. 14 MONOCEROTIS. (Σ. 938.) CCLIII.

	h.	m.	s.			s.
R. A.	6	28	48	Prec.	+	3·25
		°	′			″
Decl.	N	7	39·5	——	S	2·62

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	206·7	...	10·2	...	1831·23
Burnham	209·9	...	10·6	...	1878·20

A most delicate double star, in the Unicorn's eye. A 6, yellowish white; B [12], dusky. This is indeed a difficult object, B being the *minimum visibile* of my instrument, and only seen by such transient glimpses, that but for a distant pale 10th magnitude star in the *sp* quadrant, nearly in the same line of bearing, my estimations must have been much wider. There is also a dusky 12th star in the *sf*, at about 100″ from A; so that the whole forms a wide quadruple object. It is nearly mid-way between Procyon and the three little stars which form Orion's head—and also of a line passed from α Geminorum to α Leporis—in the middle of the Milky Way.

418. 50 H. VIII. MONOCEROTIS. (h. 396; H. 1430.)

	h.	m.	s.			s.
R. A.	6	29	0	Prec.	+	3·20
		°	′			″
Decl.	S	5	26·5	——	S	2·53

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; p Ri; l C; st S;" which means:—"a cluster; very large; pretty rich; little condensed; the stars are small."

419. 2337 Lac. CANIS MAJORIS. (*h.3871.)

	h.	m.	s.			s.
R. A.	6	29	51	Prec.	+	2·32
		°	′			″
Decl.	S	29	32·2	——	S	2·61

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	353·1	...	10 ±	...	1837·09
Jacob	354·2	...	7·4	...	1848·1
Stone, O.	353·0	...	7·6	...	1877·1

A double star. A 7½; B 8.

420. 941 Σ. AURIGÆ.

	h.	m.	s.			s.
R. A.	6	30	53	Prec.	+	4·25
		°	′			″
Decl.	S	41	40·5	——	S	2·70

	Position.	Distance.	Epoch.
	°	″	
South	85·1	1·65	1824·58
Struve, W.	77·6	1·95	1830·29
Mädler	79·7	1·67	1844·29
Gledhill	80·2	2·2	1876·09

A double star. A 7½, bluish white; B 8½, purplish white. 1° S. of 50 Aurigæ, a star of the 5th magnitude. There is a distant companion in Pos. 133°; Dist. 28.0″; Epoch 1822·2 (= South 367).

421. γ GEMINORUM. CCLIV.

	h.	m.	s.			s.
R. A.	6	31	21	Prec.	+	3·46
		°	′			″
Decl.	N	16	29·5	——	S	2·72

		Position.	Distance.	Epoch.
		°	″	
Burnham	A B	335·5	141·7	1880·03
	A C	294·7	133·0	

A coarse triple star, on the right foot of Pollux, in a rich field. A 3, brilliant white; B 13, and C 12, both pale plum colour; followed nearly on the parallel, Δ R. A. $=40^{s}$, by a 9th mag. star. This object, with ξ on the other foot, is called Alhena, from *al-hen'ah*, a ring or brand on a horse's neck, and the two form the VIth Mansion of the Moon. η is called Πρόπους by Ptolemy, as being in the fore-foot, but the name is best applied to H Geminorum, as the ante-foot, or star preceding the feet.

The alignment of this star is easy. A ray from β Orionis through the middle star of Orion's belt will pass clear of α Orionis to Alhena. The same imaginary line continued, passes close under α Geminorum: it is also about two-thirds of the distance between β Geminorum and α Orionis.

[Good low-power field.]

422. ν^1 CANIS MAJORIS. CCLV.

	h.	m.	s.			s.
R. A.	6	31	33	Prec.	+	2·62
		°	′			″
Decl.	S	18	34·1	——	S	2·80

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	259·8	17·2	1821·22
Smyth	260·2	17·2	1830·83
Main	261·6	17·3	1842·82
Stone, O.	262·4	17·4	1877·1

A neat double star, in the Greater Dog's left fore knee, and about 3° to the S.W. of Sirius. A 6½, pale garnet; B 8, grey. The pair is followed in the *sf* quadrant by ν^2.

[3° *sp* α. Motion in angle seems probable.]

423. 48 H̥. VIII. MONOCEROTIS. (h. 398; H. 1436.)

	h. m. s.		s.
R. A.	6 32 33	Prec. +	3·04
Decl.	S 1° 22′·1	—— S	2″·84

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; P; vl C; st L & S;" which means:—"a cluster; very large; poor; very little condensed; the stars are large and small, mixed."

424. 15 MONOCEROTIS. (Σ. 950.) CCLVIII.

	h. m. s.		s.
R. A.	6 34 55	Prec. +	3·30
Decl.	N 9° 59′·8	—— S	3″·02

		Position.		Distance.		Epoch.
Struve, W.	A B	208°·6	...	2″·76	...	1831·67
	A C	12·9	...	16·5		
Smyth	A B	206·2	...	2·5	...	1835·13
	A C	15	...	15		
Dembowski	A B	211·0	...	3·02	...	1868·74
	A C	13·9	...	16·2		
Hall	A B	212·6	...	3·05	...	1876·10

A delicate triple star, in a magnificent stellar field [=27 H̥. V; 5 H̥. VIII; h. 401; H. 1440], between the Unicorn's ears, at one-third of the distance from Procyon towards α Tauri. A 6, greenish; B 9½, pale grey; C [12], blue. The bright star is crowned by three pairs, of which the *sf* is the nearest. A companion in Pos. 139°, Dist. 75″, was found to be double by Dembowski: Pos. 47°; Dist. 3·8″; Epoch 1865·9.

425. 174 P. VI. LYNCIS. (Σ. 946.) CCLVI.

	h. m. s.		s.
R. A.	6 35 8	Prec. +	5·33
Decl.	N 59° 33′·3	—— S	2″·92

	Position.		Distance.		Epoch.
South	136°·8	...	4″·06	...	1825·07
Struve, W.	133·5	...	4·19	...	1830·58
Smyth	134·2	...	4·0	...	1835·11
Main	133·4	...	3·9	...	1862·31

A neat double star, under the animal's eye, nearly in mid-distance between *a* Ursæ Majoris and *a* Aurigæ, where it is crossed by a line passing from Polaris a little to the westward of Procyon. A 7½, bright white; B 10, blue: the magnitude of the latter star was carefully estimated by my usual method of assuming Piazzi's brightness of A as the standard; and also by referring directly to the companion of Polaris. Σ. from finding it 8·5 in 1827, 10 in 1831, and 8·5 again two years afterwards, asks, *Num minor variabilis ?*

The possibility of the *comes* being variable, awakens considerations of peculiar interest; it having been surmised, that certain small acolyte stars shine by reflected light, a point which has still to be ascertained. But sidereal science is yet in its infancy, [and this is quite as true in 1880 as it was in 1840].

426. V PUPPIS.

	h. m. s.		s.
R. A.	6 35 43	Prec. +	1·60
Decl.	S 48° 7′·5	—— S	3″·11

	Position.	Distance.	Epoch.
Herschel, J.	317°·0	13″·4	1836·12

A double star. A 5½, yellow; B 7½, blue.

427. 12 LYNCIS. (Σ. 948.) CCLVII.

	h. m. s.		s.
R. A.	6 36 30	Prec. +	5·32
Decl.	N 59° 33′·1	—— S	3″·19

		Position.	Distance.	Epoch.
Herschel, W.	AB AC	181°·4 302·5	1″·5 ± 9·3	1780·68
Struve, W.	AB AC	153·7 304·2	1·52 8.6	1831·10
Smyth	AB AC	149·5 305·6	1·6 8·9	1839·27
Gledhill	AB AC	134·0 306·4	1·41 8·7	1874·13

A neat triple star, on the animal's cheek, so exactly following 174 P. VI., previously described, that the alineation there given will answer for both. A 6, white; B 6½, ruddy; C 7½, bluish. By a comparison of the measures it will be seen that the two close stars have undergone great orbital change. C has remained relatively unaltered with the primary. From a rough-cast geometrical treatment of the above measures there results an *annus magnus* of nearly seven centuries.

428. 12936 Lalande CANIS MAJORIS. (β 19.)

	h.	m.	s.		s.
R. A.	6	37	3	Prec. +	2·7
Decl.	S	15°	54′·1	—— S	3″·19

	Position.	Distance.	Epoch.
Knott	169°·4	4″·0	1872·13
Dembowski	165·0	3·5	1876·26

A double star discovered by Burnham. A 7; B 9½.

429. ε GEMINORUM. CCLIX.

	h.	m.	s.		s.
R. A.	6	37	10	Prec. +	3·69
Decl.	N	25°	14′·3	—— S	3″·23

	Position.	Distance.	Epoch.
South	93°·7	111″·5	1825·04
Smyth	94·1	110·6	1831·98

A star with a distant companion, on Castor's right knee; it is about 26°, or rather more than one-third of the distance, from Procyon towards *α* Aurigæ, where a line led from *β* Orionis through *α* Orionis also reaches it. A 3, brilliant white; B 9½, cerulean blue.

This star is called Mebsuta, from *al-dhirá' al mebsúṭah*, the outstretched arm; *i. e.* Castor and Pollux.

["A, strongly yellow, 1849."—*Webb.*]

430. 223 P. VI. PUPPIS.

	h.	m.	s.		s.
R. A.	6	38	34	Prec. +	2·03
Decl.	S	38°	17′·2	—— S	3″·36

	Position.	Distance.	Epoch.
Herschel, J.	276°·1	8″·4	1835·38

A double star. A 6½; B 8.

431. 56 AURIGÆ. CCLX.

	h.	m.	s.		s.
R. A.	6	38	48	Prec. +	4·33
Decl.	N	43°	41′·1	—— S	3″·33

	Position.	Distance.	Epoch.
Herschel, W.	17°·4	52″·9	1782·80
Smyth	17·1	56·8	1831·92
Main	18·7	51·6	1862·31
Hall	21·1	48·3	1877·3

A wide double star; it is just to the N. of an imaginary line carried from α Aurigæ eastward through β, and extended as far again as the distance between those two stars. A 6, silvery white; B 8½, lilac. This is an object which, though belonging to Auriga, is in Telescopium Herschelii, an asterism proposed by the Abbé Hell to commemorate the discovery of the planet Uranus, in this spot, 13th March, 1781. It appears to have remained stationary for 50 years.

432. 958 Σ. LYNCIS.

		h.	m.	s.		s.
R. A.		**6**	**39**	**1**	Prec. +	5·02
			°	′		″
Decl.	**N**		**55**	**49·8**	—— S	3·40

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	256·7	...	5·07	...	1830·91
Main	257·7	...	5·07	...	1863·29

A double star. A 6, white; B 6, white.

433. α CANIS MAJORIS. CCLXII.

		h.	m.	s.		s.
R. A.		**6**	**40**	**18**	Prec. +	2·64
			°	′		″
Decl.	**S**		**16**	**33·7**	—— S	3·50

	Position.		Distance.		Epoch.
	°		″		
Hunt	47·5	...	1144·0	...	1879·19

A *Nautical Almanac* star, with a small companion, in the Greater Dog's mouth. A 1, brilliant white; B 10, deep yellow; other distant small stars in the field; and a line through the two here cited passes nearly upon that mentioned by Piazzi, "alia 8$^{\text{e}}$ magnit. præcedit 3″ temporis, 3′ ad Boream." A, or Sirius, is subject to a large proper motion, namely, −0·53″ in R. A. and −1·23″ in Decl. (Argelander.)

[Sirius has attracted a good deal of notice during the last few years in consequence of the discovery by Bessel that its proper motion was subject to systematic irregularities, such as to render its path really sinuous and not rectilinear. Bessel did more than this, for he suggested that an invisible companion was the perturbing agent. Peters in 1851 improved upon this idea by calculating a theoretical orbit to satisfy the observations. Finally, in 1862 Alvan Clark in America found a *comes*, hitherto undetected. It is not however by any means clear yet that Clark's star is the companion which is required to satisfy Bessel's observations. There are discrepancies which at present cannot be disposed of. More observations are needed, but few telescopes exist capable of furnishing them. Clark used an 18½$^{\text{in}}$ refractor. As regards Clark's star Burnham gives:—Pos. 48·3°; Dist. 10·0″, for the Epoch 1880·11. The angle is undoubtedly decreasing. Other companions to Sirius have been reported by Gold-schmidt, (Pos. 158°; Dist. 103″; Epoch 1878·21); by Marth, (Pos. 114°; Dist. 69″; Epoch 1878·21); and by Secchi, (Pos. 170°; Dist. 44″; Epoch 1865·06); but Burnham disbelieves in Secchi's star. At the Melbourne observatory in 1872 no fewer than 8 small stars were said to have been seen near Sirius by Ellery and others. Altogether we may say that Sirius needs continued and careful scrutiny with large telescopes for a term of years. Gledhill in his *Handbook* gives a very full account of the modern history of Sirius.]

Sirius, the Dog-star, and one of Orion's hounds, is the brightest of all the stars in the firmament, and therefore regarded as their chief; for I have frequently compared it with Canopus, the next in brilliance, when both were nearly on the meridian together, and the latter yielded the palm to Κύων. From this brilliance there is little probability of its being mistaken for any of its stellar neighbours; but it may be noted, that a line from the Pleiades through Orion's belt passes, at about 20° beyond the latter, through Sirius. The geometrical diagram here presented to the gaze was not lost to the rhymester:

> Let Procyon join with Betelgeuze, and pass a line afar,
> To reach the point where Sirius glows— the most conspicuous star;
> Then will the eye delighted view a figure fine and vast,
> Its span is equilateral, triangular its cast.

This star derived its Greek name from Σείριος, in allusion to the brightness, heat, and dryness assigned to it; though Dr. Hutton gravely informs us that the term is from *Siris*, which he says is the most ancient appellation of the Nile, for when this star rose heliacally, and became visible to the Egyptians and Ethiopians, their year commenced, and with it the inundation of their fecundating river. As that beneficial flood was attributed to the influence of the beautiful star, it was therefore worshipped as Sothis, Osiris, and Latrator Anubis; and was viewed as the abode of the soul of Isis. Jacob Bryant insists, that the word Sirius was borrowed by the Greeks from the Egyptian *Cahen Sehor;* and others recognise in it the *Mazzaroth* of Job; while Novidius, who gave a scriptural meaning to each constellation, says it alludes to Tobit's dog: "and so it may," ejaculates Moxon, "because he hath a tayle." It is first mentioned as a star by Hesiod, though Wyllyam Salysbury, 1550, and Hesychius, contend that the name applies equally to the Sun and the dog-star; and Homer, albeit he does not cite Sirius by name, compares the brightness of Achilles' armour to the pernicious blaze of the dog-star;

> Whose burning breath
> Taints the red air with fevers, plagues, and death.

Some of the ancients asserted that a star in the head of the Dog, perfectly distinguishable from Sirius, perhaps meaning γ, was designated

Isis, in former ages; but they were assuredly in error, as may be inferred from Diodorus and Plutarch, and all the honours of the constellation were vested in the Dog-star. *Lælaps,* one of Actæon's kennel, was, however, slipped in, and moreover the Latins called it *Canis Candens,* and *Canicula;* which last should seem to apply to the Lesser Dog, but that, among the many opinions on this serious topic, the show of hands is for Sirius. Yet Horace, inviting Mæcenas to quit the "Fumum et opes strepitumque" of Rome, (one would think London was meant,) for the country, during hot weather, thus describes the aspect of the heavens:

> Jam clarus occultum Andromedæ pater (*Cepheus*)
> Ostendit ignem; jam Procyon furit,
>   Et stella vesani Leonis (*Regulus*),
>   Sole dies referente siccos.

There is no end to the evil influences which the ancients attributed to this star, though Geminus considered the bulk of them as rather resulting from the Sun; yet he was borne down by those who held Sirius to be an object equally terrible and splendid. While Virgil and others considered the unhealthy and oppressive period, which followed the summer solstice in Italy, was owing to the presence of the Dog-star, Manilius thought it was a distant sun to illumine remote bodies.

From its heliacal rising the ancients reckoned their *dies caniculares,* or dog-days, which, however, in our climate, often commenced a fortnight after the veritable dog-days were ended; they have been frequently shifted and adjusted, and now seem to be established among the Almanacks, from the 3rd of July to the 11th of August; *i.e.* before Sirius rises! An extraordinary influence in engendering diseases among men, and madness among dogs, was assigned to the canicular days; hence their advent was of paramount importance, and Theon Alexandrinus has left a full formula to find the exact time of the Dog-star's rising; twenty days before which, and twenty days after, included the period of perspiration, hydrophobia, and other evils.

Canis Major is situated in the Southern Hemisphere, below Orion's feet; and the appellation of the principal star was frequently applied to the whole asterism, as an emblem of watchfulness and fidelity; hence its name Alshira, from the Arabic *Ash-shi'rá-l-Yemeníyah,* the bright shining star of Yemen, or Arabia Felix. The Greater Dog is one of the old 48 constellations, and has been thus tabulated:

Ptolemy . . .	29 stars.	Hevelius	22 stars.
Tycho Brahé . .	13 ,,	Flamsteed . . .	31 ,,
Bayer	19 ,,	Bode	161 ,,

Mr. Barker, of Lyndon, in *Philosophical Transactions,* vol. li., considered that Sirius has changed colour, from red to white, in the lapse of ages; and quotes Aratus, Cicero, Virgil, Ovid, Seneca, Horace, and Ptolemy, in proof. The ancients, however, used the names of colours with the utmost latitude. *Splendescere, purpurascere,* signified to shine brightly; ποικίλος of Aratus expresses a glittering object; and the *rubra Canicula* of Horace may allude to heat. Mr. Barker's evidence for the mutation has therein more learning than point; but Seneca has an admission that the redness of Sirius was so strong as to exceed that of Mars; and Ptolemy says it was of the same colour as Cor Scorpii. These witnesses, both men of character and trust, are directly opposed to Hyginus, who asserts that the star was white, *flammæ candorum.* This Barker gets over by considering that *candor* may be used for brightness, without regard to colour; and he might have called in Eratosthenes, a witness of high credit, to prove that Sirius at first signified bright, glittering, sparkling, and was afterwards given exclusively as the name of the most brilliant of the fixed stars. At all events, such a variation would be the more remarkable, since the other principal stars are unchanged in colour. Ptolemy calls Arcturus, Aldebaran, Pollux, Betelgeuze, and Antares, ὑπόκιῤῥος, or reddish, as they now actually are.

The brilliance of Sirius has long attracted the attention of philosophers, and every practical astronomer must be conversant with its superiority over its compeers. Sir William Herschel says, that when this star was about to enter his large telescope, the announcing light was equal to that on the approach of sunrise, and upon gaining the field of view, the star appeared in all the splendour of the rising sun, so that it was impossible to behold it without pain to the eye. By Sir J. Herschel's photometric experiments on the apparent brightness of stars, the light of Sirius was found to be about 324 times that of an average star of the 6th magnitude. Consequently, if both bodies be assumed as of similar proportions, light diminishing as the square of the distance of the luminous body increases, their respective distances from us must be in the ratio of 57·3 to 1.

Dr. Wollaston, from his ingenious researches in photometry, says, "we are not warranted by these experiments in supposing that the light of Sirius exceeds a 20,000,000,000th part of the Sun's light." (*Phil. Trans.* vol. cxix.)

434. 215 P. VI. LYNCIS. (Σ. 960.) CCLXI.

	h. m. s.		s.
R. A.	**6 40 47**	Prec.	+ 4·83
	° ′		″
Decl.	**N 53 9·3**	——	S 3·52

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	66·4	...	21·9	...	1829·21
Smyth	69·1	...	23·0	...	1831·78

A delicate double star, on the neck of the Lynx; it is about 11° on a line shot from β Aurigæ towards α Ursæ Majoris, or nearly one-third of that distance. A 8, bright yellow; B 11, dusky green.

435. 71 H. VIII. AURIGÆ. (H. 1451.)

		h.	m.	s.			s.
R. A.		6	41	36	Prec.	+	4·22
		°	′				″
Decl.	N	41	10·9		——	S	3·62

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p Ri; v l C; st p L;" which means:—"a cluster; pretty rich; very little condensed; stars pretty large."

436. 31 H. VIII. MONOCEROTIS. (h. 408; H. 1443; ℞.) CCLXIV.

		h.	m.	s.			s.
R. A.		6	42	12	Prec.	+	3·00
		°	′				″
Decl.	S	3	3·1		——	S	3·67

A loose cluster in the Galaxy, on the Unicorn's breast; 15° on a line from β Canis Majoris towards β Geminorum. It is a region of stars extending far beyond the field, with the principal members from the 8½ to the 11th magnitudes, curiously studded in pairs and triplets. Between these a certain glow indicates numbers of others still smaller.

437. 41 M. CANIS MAJORIS. (h. 411; H. 1454.) CCLXV.

		h.	m.	s.			s.
R. A.		6	42	13	Prec.	+	2·57
		°	′				″
Decl.	S	20	37·8		——	S	3·68

	Position.		Distance.		Epoch.
	°		″		
SMYTH	85	...	45	...	1836·17

A double star, in a scattered cluster, on the Greater Dog's chest. A 9, lucid white; B 10, pale white. This was registered by Messier in 1764 as a "mass of small stars;" but it is divided into 5 groups, of which the central one is the richest, and marked by three bright stars forming a crescent. In the *np* is the open double star which is here estimated. As a beacon is rather acceptable in so low a declination, the tyro may hit his object by first directing his telescope—charged with a low power—upon Sirius, and then depressing it 4° 5′, when in about a minute a pair of 8th magnitudes will appear, constituting 233 and 236 P. VI., and in about another minute, this cluster will follow.

["Larger stars in curves, with ruddy star near centre."—*Webb.*]

["This nebula was also observed by Flamsteed."—*Sir J. Herschel.*]

438. 14 LYNCIS. (Σ. 963.) CCLXIII.

	h.	m.	s.			s.
R. A.	6	43	23	Prec.	+	5·32
		°	′			″
Decl.	N	59	37·6	——	S	3·89

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	50·5	...	0·89	...	1830·88
SMYTH	50·0	...	1·0	...	1833·31
SECCHI	56·6	...	0·76	...	1857·20
GLEDHILL	64·1	...	0·7	...	1875·10

A close double star, under the Lynx's eye; between Dubhe and Capella. A 5½, golden yellow; B 7, purple. This is one of Σ.'s *pervicinæ.*

It is a very delicate and pretty object, and only seen with dark notches at intervals, being in contact in general, yet with the colours distinct.

[A slight increase in angle and decrease in distance seems well established.]

439. 578 Dunlop CANIS MAJORIS. (h. 3065; H. 1463.)

	h.	m.	s.			s.
R. A.	6	45	5	Prec.	+	2·12
		°	′			″
Decl.	S	35	52·9	——	S	3·92

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; p L; i R; g b M; rr;" which means:—"a globular cluster; bright; pretty large; of an irregular round outline; gradually brighter in the middle; partially resolved—some stars visible."

440. 59 AURIGÆ. (Σ. 974.) CCLXVI.

	h.	m.	s.			s.
R. A.	6	45	27	Prec.	+	4·13
		°	′			″
Decl.	N	39	0·1	——	S	3·86

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	216·9	...	23·5	...	1782·85
STRUVE, W.	222·6	...	22·2	...	1831·11
SMYTH	222·9	...	22·0	...	1833·10
FLAMMARION	224·1	...	22·2	...	1877·8

A delicate double star, between the Waggoner's left arm and the Lynx. A 6, pale yellow; B 11, livid.

This star is certainly one of no easy measurement, but our results are sufficiently strong to warrant the inference of a slow *spnf*, or direct angular motion. A glance from the Hyades through β Tauri, at the tip of the Bull's left horn, carried about 22° into the N.E., will strike upon 3 small stars, of which the most northern is the one under discussion. This place will also be intersected by a line from Procyon through δ Geminorum; and by another from Orion's sword cluster, through the lowest star of the belt and α Orionis, and extended three times further towards the N.E.

441. 27 H. VI. MONOCEROTIS. (h. 413; H. 1465.) CCLXVII.

		h.	m.	s.		s.
R. A.		6	46	7	Prec. +	3·08
			°	′		″
Decl.	N		0	35·3	—— S	4·01

		Position.		Distance.		Epoch.
		°		″		
Burnham	A B	8·0	...	20·9	...	1880·06
	B C	281·9	...	8·6		

A compressed cluster in the Via Lactea, on the Unicorn's neck. A 8½, pale straw-colour; B 9½, light grey. This object is broken into three several rich groups, occupying a very considerable space. Near the centre is the double star here observed, but, from having a small *comes* in the *np* quadrant, it ought rather to be registered triple. A trapezium of brighter stars follows; and it is to be fished up about one-third of the distance between Procyon and β Orionis, where it is intersected by a transverse line from β Geminorum to about 1° W. of β Canis Majoris.

["Bright Galaxy cluster resembling 3 arms of a cross."—*Webb.*]

442. 38 GEMINORUM. (Σ. 982) CCLXVIII.

		h.	m.	s.		s.
R. A.		6	48	26	Prec. +	3·38
			°	′		″
Decl.	N		13	19·1	—— S	4·10

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	179·9	...	7·9	...	1781·99
Struve, W.	174·9	...	5·7	...	1829·24
Smyth	170·7	...	5·8	...	1839·17
Secchi	169·3	...	6·1	...	1856·11
Jedrzejewicz	163·6	...	6·3	...	1878·19

A neat double star, on the left instep of Pollux. A 5½, light yellow; B 8, purple. This is a very fine object, and the colours so marked, that they cannot be entirely imputed to the illusory effect of contrast. A glance from β Orionis carried below ζ—the southern star of Orion's belt—and prolonged rather more than twice as far again, till it meets a line cast between Procyon and β Tauri, will have just passed over it.

[The angle is plainly diminishing and the distance increasing. O. Struve suggests that H.'s distance for 1781 is much too great. Smyth inferred a period of more than 2000 years.]

443. 2 H. VI. GEMINORUM. (h. 415; H. 1467; B.) CCLXIX.

		h.	m.	s.			s.
R. A.		6	48	51	Prec.	+	3·50
		°	′				″
Decl.	N	18	7·2		——	S	4·12

A compressed cluster, on the calf of Pollux's right leg, one third of the distance from β Geminorum to β Orionis, on a line carried from the former star between the second and third "bullions" of Orion's belt to the latter. It is a faint angular-shaped group of extremely small stars—say 12th to 16th magnitudes—which only under the most favourable circumstances can I discern with satisfaction. The region around is immensely rich, and not at all wanting in double stars. When best seen, it is something like the hasty sketch herewith given.

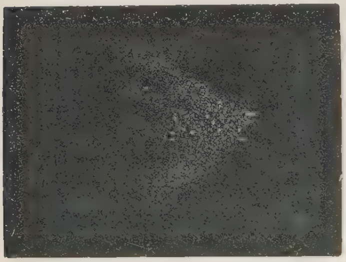

FIG. 11. 2 H. VI. GEMINORUM.

[Engraved in *Phil. Trans.*, 1833, Pl. viii. Fig. 91; but that engraving is stated by the Parsonstown Observers to make the object look richer than it really is.]

444. 973 Σ. CAMELOPARDI.

		h.	m.	s.			s.
R. A.		6	49	27	Prec.	+	8·14
		°	′				″
Decl.	N	75	23·6		——	S	4·30

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	26·7	...	11·9	...	1831·84
MAIN	24·3	...	11·8	...	1863·25

A double star. A 7, white; B 8, white. The annual displacement of this star in R.A. owing to precession is greater than that of any other object in this book.

445. 17 [π^2] CANIS MAJORIS. CCLXX.

	h.	m.	s.			s.
R. A.	6	50	18	Prec.	+	2·59
		°	′			″
Decl.	S	20	15·9	——	S	4·36

		Position.		Distance.		Epoch.
		°		″		
SMYTH	A B	149·0	...	45·0	...	1834·14
	A C	182·5	...	52·5		
	A D	185·0	...	125·0		
MAIN	A B	146·5	...	44·2	...	1863·16

A coarse quadruple star, on the chest of Canis Major; where it is the middle one of three small stars, about 4½° to the S.S.E. of Sirius. A 6, flushed white; B 9½, ruddy; C [9½], ruddy; D [10], dusky.

[Smyth's measures are nearly identical with South's in 1825.]

446. μ CANIS MAJORIS. (Σ. 997.) CCLXXI.

	h.	m.	s.			s.
R. A.	6	51	3	Prec.	+	2·74
		°	′			″
Decl.	S	13	54·2	——	S	4·53

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	343·5	...	3·22	...	1831·20
SMYTH	342·9	...	3·5	...	1834·15
SECCHI	338·9	...	2·98	...	1856·47
DOBERCK	342·2	...	2·53	...	1878·08

A neat double star, on the Dog's right ear; where a line through Orion's belt will meet it, at nearly 4° N.E. of Sirius. A 5½, topaz yellow; B 9½, grey.

[There appears to be no change in the angle, but perhaps a slight decrease in the distance.]

447. ε CANIS MAJORIS. CCLXXIII.

	h.	m.	s.			s.
R. A.	6	54	18	Prec.	+	2·35
		°	′			″
Decl.	S	28	49·3	——	S	4·70

		Position.		Difference of R. A.		Epoch.
		°		s.		
SMYTH	A C	84·5	...	24·1	...	1834·83

		Position.		Distance.		Epoch.
		°		″		
MACLEAR	A B	160·4	...	7·4	...	1850·10
BURNHAM		160·2	...	7·4	...	1878·20

A *Nautical Almanac* star with a distant companion, on the Greater Dog's body: it will be readily found by running a line from the middle of Orion's belt through β, the bright star to the W. of Sirius, and extending the same 14° further into the S.E. quarter. A 2½, pale orange; [B 9; C 7].

This star is called Adara, from *al 'adhára*, the virgins; ο, η, δ, and ε, on the shoulder, tail, and between the tail and legs. Adjacent to these Royer cut away a portion of Canis Major, and constructed Columba Noachi therewith in 1679. The part thus usurped was called Muliphein, from *al-muhlefeïn*, the two stars sworn by, because they were often mistaken for *Soheïl*, or Canopus, before which they rise: these two stars are now α and β Columbæ. The galley rhymes allude to Royer's robbery—

> Where Canis Major, from the south, th' horizon moves above—
> The stars that deck'd his hinder feet now form the Patriarch's Dove.

448. 14 H. VII. CANIS MAJORIS. (h. 422, 3070; H. 1479.) CCLXXII.

		h.	m.	s.			s.
R. A.		6	54	28	Prec.	+	2·76
		°	′				″
Decl.	S	13	33·0		——	S	4·73

A tolerably compressed cluster at the back of the Greater Dog's head, principally composed of stars from the 8th to the 11th magnitudes, of which the four principal form the letter Y; there are also some glimpse stars, but to no great extent. Yet to H.'s powerful "ken" it appeared to be 20′ in diameter in February, 1785. It may be fished up by first finding μ, the object above registered; when it will appear in the *nf* quadrant, well within a degree's distance.

["A region rich in stars."—*Brodie.*]

449. 301 P. VI. LYNCIS. (Σ. 1009.) CCLXXIV.

		h.	m.	s.			s.
R. A.		6	56	55	Prec.	+	4·79
		°	′				″
Decl.	N	52	55·4		——	S	4·95

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	167·4	...	3·5 ±	...	1782·87
Struve, W.	159·2	...	2·9	...	1830·34
Smyth	159·4	...	3·0	...	1843·19
Secchi	157·0	...	3·4	...	1858·27
Jedrzejewicz	156·4	...	3·2	...	1880·26

A neat double star, on the animal's neck; where a ray conducted from Polaris to the W. of Castor passes over it at 35° from the pole, or rather more than half-way, on the line between β Aurigæ and β Ursæ Majoris. A 6, and B 6½, both white. The measures are more discordant than might have been expected, [but a slight decrease of angle seems probable].

450. ζ GEMINORUM. CCLXXV.

		h.	m.	s.			s.
R. A.		6	57	35	Prec.	+	3·56
Decl.	N	20°	43·9′		——	S	5·06″

		Position.	Distance.	Epoch.
Herschel, W.	A B	351·2°	91·8″	1779·77
Burnham	A B	351·6	93·6	1880·00
	A C	83·7	87·2	

A course triple star, on the right knee of Pollux. A 4, pale topaz; B 8, violet; and C 13, grey.

This star is called Mekbuda. It is easily seen on running a line between the cluster in Orion's sword and β Geminorum, for it passes over ζ at 9° from the latter star; and it is near the mid-distance between ζ Tauri, the tip of the S. horn, and the Præsepe in Cancer.

451. 50 M. MONOCEROTIS. (h. 425; H. 1483; R.) CCLXXVI.

		h.	m.	s.			s.
R. A.		6	57	41	Prec.	+	2·88
Decl.	S	8°	10·7′		——	S	5·06″

	Position.	Distance.	Epoch.
Smyth	170°	5″	1833·25

A delicate and close double star in a cluster of the Via Lactea, on the Unicorn's right shoulder. A 8 and B 13, both pale white. This is an irregularly round and very rich mass, occupying with its numerous outliers more than the field, and composed of stars from the 8th to the 16th magnitudes; and there are certain spots of splendour which indicate minute masses beyond the power of my telescope. The most decided points are, a red star towards the southern verge, and a pretty little equilateral triangle of 10th sizers, just below, or N. of it. The double star here noted was estimated: this was made triple by H., whose 2357 of the Fifth Series it is. It is sufficiently conspicuous as a double star, and though I perceive an infinitesimal point exactly on the vertical of A, I cannot ascertain whether it is H.'s C.

This superb cluster was discovered by Messier in 1771, and registered "a mass of small stars more or less brilliant." It is 9° N.N.E. of Sirius, or rather more than one-third of the distance between that star and Procyon.

452. 40 H̥. VIII. GEMINORUM. (h. 432; H. 1490; R.)

	h.	m.	s.			s.
R. A.	7	0	39	Prec.	+	3·74
		°	′			″
Decl.	N	27	21·7	——	S	5·24

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; v l C; Scl inv;" which means:—"a cluster; large; very little condensed; there is a small cluster involved in the chief one."

At Parsonstown on December 12, 1866, 50 stars large and small were counted in the finder. The small cluster is described as "neat and consisting of 6 or 7 stars close together and well isolated from the rest." 6 of them were of mags. 10–12, and there were one, or perhaps two, much smaller.

453. 2640 Lac. CARINÆ.

	h.	m.	s.			s.
R. A.	7	1	33	Prec.	+	0·92
		°	′			″
Decl.	S	59	0·9	——	S	5·32

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	74·9	...	2·40	...	1836·22

A double star, A 6½; B 7½.

454. 33 H̥. VIII. MONOCEROTIS. (H. 1498; Σ. 1028.)

CCLXXVII.

	h.	m.	s.			s.
R. A.	7	3	5	Prec.	+	2·83
		°	′			″
Decl.	S	10	27·0	——	S	5·46

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	302·3	...	10·9	...	1831·16
Smyth	300	...	15	...	1833·12

A double star in a loose cluster, under the Unicorn's chest, and about 8° N.E. of Sirius, in a direction pointed out by leading a line from α Tauri over γ Orionis, and nearly twice as far again. A 9, yellow; B 12, dusky. This is a scattered group of stars, in an irregular lozenge form, and consists chiefly of three vertical rows, having four individuals in each; several are of the 9th magnitude, and reddish.

["A region rich in stars, but hardly to be called a 'cluster.'"—*Brodie.*]

455. δ CANIS MAJORIS. CCLXXVIII.

	h.	m.	s.			s.
R. A.	7	3	55	Prec.	+	2·44
		°	′			″
Decl.	S	26	13·1	——	S	5·53

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	224·1	...	265·9	...	1880·00

A star with a distant companion on the loins of Canis Major; where a line from α Orionis to the S.S.E., through Sirius, intercepts it at 12° below that star. A $3\frac{1}{2}$, light yellow; B $7\frac{1}{2}$, very pale; other small stars in the field, and *np* is the one mentioned by Piazzi, "Alia 9ae magnitud. præcedit 45·5″ temporis, 1′ 48″ ad boream." [Knott rates B at $9\frac{1}{2}$, and suggests a misprint.] My observations are, of course, not sufficiently nice for an authority, but still they countenance the slight proper motion attributed to this star, both in R. A. and Declination. It is considered variable; having been registered 2nd magnitude by Hevelius, La Caille, and Brisbane; $2\frac{1}{2}$ by Halley; 3 by Ptolemy, Tycho, and Flamsteed; and $3\frac{1}{2}$ by Piazzi and Johnson.

δ is called Wezen, *al-wezn*, weight, from appearing to rise with difficulty above the horizon, as if chained to the ground. The same sluggishness was applied to α and β Centauri, which 1000 years ago, under the 30th parallel of latitude, only obtained a meridian altitude of 4°. The most general application, however, of the name will be found under ε Canis Majoris.

456. — CARINÆ. (*h. 3941.)

	h.	m.	s.			s.
R. A.	7	7	50	Prec.	+	0·84
		°	′			″
Decl.	S	60	12·5	——	S	5·85

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	310·4	...	0·81	...	1836·92

An exceedingly difficult double star. A 8; B $8\frac{1}{2}$.

457. — CANIS MAJORIS. (*h. 3938.)

	h.	m.	s.			s.
R. A.	7	9	10	Prec.	+	2·53
		°	′			″
Decl.	S	22	42·8	——	S	5·96

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	252·6	...	18 *est.*	...	1837·09

A double star. A $7\frac{1}{2}$; B $8\frac{1}{2}$.

458. 34 H. VIII. MONOCEROTIS. (H. 1506; Σ. 1052.)

CCLXXIX.

	h. m. s.		s.
R. A.	7 9 20	Prec. +	2·84
	° ′		″
Decl.	S 10 5·7	—— S	6·07

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	20·3	19·9	1831·19
Smyth	22·0	21·0	1837·91
Main	21·1	20·3	1863·12

A neat double star, on the following boundary of a loose cluster in the Galaxy, between the Unicorn and the Greater Dog's head. A 8, and B 8½, both silvery white. This is a very rich field of stars, in the which is a brilliant oval mass, bounded by a sapphire-tinted 6th magnitude star, in the *sf* quadrant, and the pair here measured a little N. of it.

A line from β Geminorum, passed by β Canis Majoris to nearly as far again, will find this object posited 9° E.N.E. of Sirius.

459. γ PISCIS VOLANTIS.

	h. m. s.		s.
R. A.	7 9 42	Prec. —	0·48
	° ′		″
Decl.	S 70 19·2	—— S	6·0

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	301·3	12·8	1836·37
Santiago Obs.	302·5	13·0	1851·06

A double star. A 5; B 7.

460. λ GEMINORUM. (Σ. 1061.)

CCLXXX.

	h. m. s.		s.
R. A.	7 11 46	Prec. +	3·45
	° ′		″
Decl.	N 16 44·3	—— S	6·18

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	30·9	9·5	1829·86
Smyth	29·2	10·3	1838·79
Barclay	47·6	9·0	1872·97

A delicate double star on the left thigh of Pollux, about 12° on a line from Procyon towards β Aurigæ, in the N.N.W., and rather less than a third of the distance between α Geminorum and Sirius. A 4½, brilliant white; B 11, yellowish.

λ Geminorum has been placed on the variable class, but I could detect no difference in its brightness as compared with 22 Monocerotis, ν Orionis, and 2 Lyncis.

[This star is not now considered to be variable.]

461. 12 H. VII. CANIS MAJORIS. (h. 440, 3076; H. 1512.) CCLXXXIV.

		h.	m.	s.			s.
R. A.		7	12	51	Prec.	+	2·72
Decl.	S	15°	26′·5		——	S	6″·27

A tolerably compressed but extensive cluster, on the boundary between the Unicorn and the Greater Dog. It consists of a singular group of very lucid specks, formed of stars nearly all of the 10th magnitude. The most compressed portion occupies a third of the field with power 66; and it is followed by a solitary yellowish star, of the 8th magnitude. It can be fished up, under a moderately magnifying eye-piece, at 7½° W.N.W. of Sirius; where an imaginary line from α Tauri passed over γ Orionis will intersect it.

[3° *f* γ Canis Majoris.]

462. 1051 Σ. CAMELOPARDI.

		h.	m.	s.			s.
R. A.		7	13	21	Prec.	+	7·37
Decl.	N	73°	16′·0		——	S	6″·31

		Position.	Distance.	Epoch.
Struve, W.	A B	268°·4	1″·22	1831·86
	A C	81·5	31·17	
Dembowski	A B	273·5	1·31	1878·25

A double star. A 7, white; B 9; C 7.

463. δ GEMINORUM. (Σ. 1066.) CCLXXXIII.

		h.	m.	s.			s.
R. A.		7	13	33	Prec.	+	3·59
Decl.	N	22°	11′·3		——	S	6″·33

	Position.	Distance.	Epoch.
South	195°·4	7″·25	1822·14
Struve, W.	196·9	7·15	1829·72
Smyth	196·8	7·2	1838·92
Secchi	200·0	7·16	1856·11
Doberck	204·3	7·37	1878·09

A *Nautical Almanac* star of the second rank, double, on the right hip of Pollux; it is exactly half-way between the Præsepe and ζ Tauri, on the tip of the Bull's S. horn, and nearly on the line from *a* Geminorum towards Sirius. A 3½, pale white; B 9, purple. This delicate object is rather troublesome to measure in distance, from disparity, but certainly with my instrument is not "one of the most difficult stars in the heavens."

This star is known as Wasat, from the Arabic *al-wasat,* the middle or centre.

[A small increase in angle is certain, but the distance appears to be unchanged.]

464. 20 LYNCIS. (Σ. 1065.) CCLXXXII.

		h.	m.	s.			s.
R. A.		7	13	51	Prec.	+	4·61
		°	′				″
Decl.	N	50	19·4		——	S	6·32

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	253·4	15·0	1830·55
Smyth	253·3	15·2	1835·39
Main	253·1	14·8	1862·31
Jedrzejewicz	253·9	15·1	1878·29

A neat double star, on the animal's chest; and 16° E.N.E. of *a* Aurigæ. A and B, both 7½, and silvery white.

The relative fixity of these stars may be considered as established.

465. 19 LYNCIS. (Σ. 1062.) CCLXXXI.

		h.	m.	s.			s.
R. A.		7	13	53	Prec.	+	4·93
		°	′				″
Decl.	N	55	28·6		——	S	6·30

		Position.	Distance.	Epoch.
		°	″	
Herschel, W.	A B	316·9	14·1	1782·86
Struve, W.	A B	313·8	14·7	1829·51
Smyth	AB	312·4	14·6	1833·77
	AC	358·2	215·2	
Main	A B	312·5	14·3	1862·31

A coarse triple star, in the nape of the Lynx's neck, nearly in mid-distance of an imaginary line thrown from Polaris to Pollux. A 7, white; B and C, both 8, and plum-coloured.

466. 30 CANIS MAJORIS. (17 ♅. VII; h. 441, 3077; H. 1513.) CCLXXXV.

	h.	m.	s.			s.
		°	′			″
R. A.	7	14	28	Prec.	+	2·48
Decl.	S	24	45·2	——	S	6·38

		Position.		Distance.		Epoch.
		°		″		
Smyth	A D	73·0	...	85	...	1834·83
Herschel, J.	A B	85·8	...	8·0	...	*not stated.*
	A C	73·3	...	15·0		
Burnham	A B	91·0	...	7·8	...	1880·20
	A C	80·3	...	14·3		
	A D	78·0	...	84·4		

A star with companions, in a rather large cluster, on the Greater Dog's back; where a line from γ Orionis through Sirius, and 12° beyond, will find it. A 6½, white; D 9, pale grey. The whole has a beautiful appearance, the bright white star A being surrounded by a rich gathering of minute companions, in a slightly elongated form, and nearly vertical position.

[Sir J. Herschel's measures are taken from the *Cape Obs.*, p. 191. He simply says:—"Triple; chief of a fine cluster." His mags. are 5½, 11, 12. Its Cape number is 3948.]

467. 2779 Lac. CARINÆ.

	h.	m.	s.			s.
		°	′			″
R. A.	7	17	42	Prec.	+	1·45
Decl.	S	52	7·0	——	S	6·67

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	16·1	...	10·5	...	1834·98
Santiago Obs.	28·3	...	8·2	...	1852·14

A double star. A 6½; B 7. This object points to a coarse double star 7′ or 8′ distant.

468. 35 ♅. VIII. PUPPIS. (h. 3080; H. 1521.)

	h.	m.	s.			s.
		°	′			″
R. A.	7	18	54	Prec.	+	2·78
Decl.	S	13	2·9	——	S	6·77

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; p Ri; l C; st L;" which means:—"a cluster; very large; pretty rich; little condensed; the stars are large."

Engraved, Lassell, *Mem. R. A. S.*, vol. xxiii. Pl. ii. Fig. 9.

469. 61 GEMINORUM. CCLXXXVI.

		h.	m.	s.		s.
R. A.		7	19	6	Prec. +	3·54
			°	′		″
Decl.	N		20	28·7	—— S	6·87

		Position.	Distance.	Epoch.
		°	″	
Herschel, W.	D C	46·1	6·2	1781·99
Smyth	A B	110	60	1835·83
	D C	42·4	6·5	
Dawes	D C	44·0	6·5	1854·18

A coarse double star pointing to a neat pair in the *np* quadrant, on the loins of Pollux, and about 2° to the S.E. of δ Geminorum, the alignment of which has been given. A 7½, deep yellow; B 9, yellowish; C 8, blue; D 9, bluish; and besides these, the field is very rich in small stars.

[Neither Webb in 1855, nor Knott in 1861, could find a star answering to Smyth's B. Smyth's D C constitute Σ. 1083.]

470. η CANIS MAJORIS. CCLXXXVII.

		h.	m.	s.		s.
R. A.		7	19	44	Prec. +	2·37
			°	′		″
Decl.	S		29	5·3	—— S	6·83

	Position.	Distance.	Epoch.
	°	″	
Smyth	285	169	1833·82
Burnham	285	178·6	1880·03

A star with a distant companion, at the root of the Greater Dog's tail; where an imaginary line from the 3 small stars forming Orion's head, passed through Sirius, will strike it at 17° beyond. A 3, pale red; B 7½, dull grey; two small stars following. A is called Aludra, from the Arabian *al-'adhrá*, which is the singular of *al-'adhára*. (See ε Canis Majoris.)

According to the *Megale Syntaxis*, Hipparchus found that the solstitial colure passed through the caudine star of the Greater Dog, which appears to have occasionally served, by its arrival at the meridian, to indicate the zero for reckoning the hours; its R.A., which was then exactly 90°, rendering it convenient for that purpose. If the longitude assigned by Hipparchus to this star be compared with its present place, the annual precession will be 50·7″; and both the theory of gravitation and the deductions of modern operations coincide in indicating 50·1″ as the mean annual value. This will very nearly agree with the Platonic year, or complete revolution of the equinoxes in 25,920 years, as given by Ricciolus and approved by Flamsteed, at the rate of a degree in about

72 years. Well may Hipparchus be dubbed the Præses of ancient astronomers! (See *α* Leonis.)

471. 2801 Lac. PUPPIS. (*h. 3966.)

		h.	m.	s.			s.
R. A.		7	20	53	Prec.	+	2·12
Decl.	S	37°	3′·9		——	S	6″·93

	Position.		Distance.		Epoch.
Herschel, J.	140°·9	...	7″·0	...	1835·96

A double star. A 7½; B 7½.

472. 540 Sou. GEMINORUM.

		h.	m.	s.			s.
R. A.		7	21	6	Prec.	+	3·59
Decl.	N	22°	22′·2		——	S	6″·95

	Position.		Distance.		Epoch.
South	275°·9	...	35″·6	...	1825·09

Webb thus describes this object:—"A fine pair, 7½, 9; red, blue; about 40′ N. of 63, a 6th mag. star with a minute attendant, which is 2° *f* δ, a little S."

473. *β* CANIS MINORIS. CCLXXXIX.

		h.	m.	s.			s.
R. A.		7	21	11	Prec.	+	3·26
Decl.	N	8°	30′·6		——	S	6″·94

		Position.		Distance.		Epoch.
Burnham	A B	76°·6	...	122″·3	...	1880·00
	A C	310·1	...	138·8		

A wide triple star, on Procyon's neck; rather better than 4° to the N.N.W. of its lucida, where its magnitude readily points it out. A 3, white; B 12, orange; C 10, flushed; the last is coarsely double with one of the same magnitude, and there are other stars in the field, of which the white one preceding is that alluded to by Piazzi, "Alia 8^{ae} magnitudin. præcedit 43″ temporis, 2½′ circiter ad boream." The large individual is named Gomeisa, from *al-ghomeïṣá*, watery-eyed; and it is *Al-Mirzam*, one of the "roarers," mentioned under *β* Canis Majoris.

474. 63 GEMINORUM. CCLXXXVIII.

		h.	m.	s.			s.
R. A.		7	21	13	Prec.	+	3·57
		°	′				″
Decl.	N	21	40·4		——	S	6·90

	Position.		Distance.		Epoch.
	°		″		
Smyth	325·0	...	50	...	1831·95
Main	324.3	...	44·6	...	1863·17

A wide double star on the back of Pollux; following δ Geminorum, within 2°, about E. by S. A 6, yellow; B [11], reddish, and with two telescopic stars in the *sp* quadrant they form a regular curve. The results lead to the inference that these stars are only optical neighbours.

475. 44 ♅. VIII. CANIS MINORIS. (H. 1533.)

		h.	m.	s.			s.
R. A.		7	22	39	Prec.	+	3·23
		°	′				″
Decl.	N	7	15·5		——	S	7·07

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; P; vl C; st L;" which means:—"a cluster; large; poor; very little condensed; the stars are large."

476. 45 ♅. IV. GEMINORUM. (h. 450; H. 1532; Ɍ.) CCXC.

		h.	m.	s.			s.
R. A.		7	22	41	Prec.	+	3·56
		°	′				″
Decl.	N	21	8·1		——	S	7·09

	Position.		Distance.		Epoch.
	°		″		
Knott	2·4	...	100·	...	1864·96

A star enveloped in an atmosphere, with a distant companion on the loins of Pollux. A 7½, greyish white; B 8, dusky blue; ["a third star 12½ mag. in *np* quadrant." *Knott*;] other stars following. This was observed by ♅. in 1787, as a "star of the 9th magnitude, with a pretty bright nebulosity, equally dispersed all around. A very remarkable phenomenon." H. describes it as "a star of the 8th magnitude, exactly in the centre of an exactly round bright hemisphere 25″ in diameter." The beauty of this is, in great measure, lost to my instrument, for I could only bring it to bear as a burred star: it lies about 2° to the E.S.E. of δ Geminorum, whose alignment is already treated of. (See No. 463.)

[Webb finds the nebulosity to be much easier than Smyth's account led him to expect. The Earl of Rosse saw the star surrounded by a small circular nebula in which, close to the star, was a little dark spot. This nebula was encompassed first by a dark and then by a luminous ring, bright and flickering. Brodie simply says:—"Very curious in 8½in refractor." Knott reverses the magnitudes of A and B. Fletcher asserted confidently that A is variable. In April, 1865, he saw it no brighter than a 10th mag. star.]

[Engraved, *Phil. Trans.*, 1850, Pl. xxxviii. Fig. 15; Lassell, *Mem. R. A. S.*, vol. xxiii., Pl. ii. Fig. 6.]

477. 116 P. VII. MONOCEROTIS. (Σ. 1097.) CCXCI.

	h.	m.	s.			s.
R. A.	7	22	42	Prec.	+	2·82
		°	′			″
Decl.	S	11	20·0	——	S	7·09

		Position.	Distance.	Epoch.
		°	″	
Struve, W.	A C	312·2	20·2	1832·15
Main	A C	311·2	20·5	1863·14
Dembowski	A B	166·3	0·80	1875·52
Burnham	A D	157·3	23·4	1878·14
	A E	41·4	31·0	

A delicate [quintuple] star, under the Unicorn, where a line from β Canis Majoris, led through Sirius about 11° to the E.N.E., will meet it. A 7, yellow; [B 8; C 9; D. 10; E. 13].

This object is close to the gap in the fanciful boundary which marks out Argo's northern limb on our maps; which gap cuts a narrow slice of about 13° long by 1° broad, right through the body of Monoceros, in order to catch up a star pertaining to Canis Minor, which Flamsteed, by some mistake, registered as 13 Navis. A and C point upon a distant telescopic group in the *np*. [AB = β 332.]

478. 11 H. VIII. GEMINORUM. (H. 1534; R.)

	h.	m.	s.			s.
R. A.	7	22	53	Prec.	+	3·38
		°	′			″
Decl.	N	13	59·6	——	S	7·10

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p Ri; C;" which means:—"a cluster; pretty rich; compressed." On Feb. 22, 1867, at Parsonstown there were counted 70 stars nearly contained in one field 16′ in diameter, about 10 of them being of the 11th mag. and the rest smaller.

479. 36 H. VIII. PUPPIS. (h. 451; H. 1535.)

	h.	m.	s.			s.
R. A.	7	23	2	Prec.	+	2·82
		°	′			″
Decl.	S	11	31·1	——	S	7·11

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; vL; vlC;" which means:—"a cluster; very large; very little compressed."

480.

1104 Σ. PUPPIS.

		h.	m.	s.			s.
R. A.		7	24	22	Prec.	+	2·74
		°	′				″
Decl.	S	14	45·1		——	S	7·22

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	292·4	2·35	1834·88
DEMBOWSKI	312·3	2·21	1864·50
WILSON and SEABROKE	314·0	2·55	1874·17
STONE, O.	318·3	2·29	1878·44

A double star. A 7, white; B 9, white.
An increase in the angle seems certain.

481.

124 P. VII. PUPPIS.

		h.	m.	s.			s.
R. A.		7	24	38	Prec.	+	2·30
		°	′				″
Decl.	S	31	37·6		——	S	7·25

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	51·8	9·6	1836·91
STONE, O.	51·9	9·4	1877·20

A double star. A 6½; B 7½.

482.

1108 Σ. GEMINORUM.

		h.	m.	s.			s.
R. A.		7	26	15	Prec.	+	3·61
		°	′				″
Decl.	N	23	7·8		——	S	7·38

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	179·1	11·5	1827·27
BURNHAM	179·5	11·5	1879·23

A double star. A 7, yellowish white; B 9, bluish.

483.

S. CANIS MINORIS.

		h.	m.	s.			s.
R. A.		7	26	45	Prec.	+	3·26
		°	′				″
Decl.	N	8	33·2		——	S	7·40

A red and variable star discovered by Hind in 1856. The magnitude ranges from 7½ to below 12. As regards colour, Hind terms it "fiery;"

Winnecke "stark roth;" Vogel simply "roth." Schönfeld thinks that the period, which is usually set down at 332^d, is diminishing.

484. *α* GEMINORUM. (Σ. 1110.) CCXCII.

R. A. 7h 27m 35s | Prec. + 3s.85

Decl. N 32° 7′.8 | —— S 7″.48

		Position.		Distance.		Epoch.
Herschel, W.	A B	302°.8	...	5″.16	...	1778.27
Herschel, J., and South	A B	267.1	...	5.35	...	1821.21
Smyth	A B	258.8	...	4.7	...	1830.95
	A C	162.0	...	72.9		
Mädler	A B	252.8	...	4.88	...	1841.11
Johnson	A B	245.7	...	5.07	...	1850.21
Main	A B	240.8	...	5.51	...	1861.13
Talmage	A B	240.5	...	5.65	...	1870.35
Doberck	A B	235.1	...	5.55	...	1878.11
Jedrzejewicz	A B	234.6	...	5.64	...	1878.21
	A C	164.0	...	73.28		

A *Nautical Almanac* star, and well-known binary, in the head of Castor, and about half way between *α* Leonis and *α* Tauri. A 3, bright white; B 3½, pale white; C [9], dusky, and there is another very small acolyte at a distance, in the *sp* quadrant of the field, [which however appears to have no physical connection with the primary: at least the alteration in angle and distance are so small in ½ a century as to seem accidental].

In order to arrive at some deductions, Sir J. Herschel gathered together all the observations he could rely upon, it being a question he was deeply interested in, because, he says, Castor is "the largest and finest of all the double stars in our hemisphere, and that whose unequivocal angular motion first impressed on my father's mind a full conviction of the reality of his long cherished views on the subject of the binary stars." By the alignments of Pound and Bradley, he was able to carry the angle back for upwards of 100 years; and by computations as careful as the then state of the subject would allow, he deduced a period of 253^y. "This star," he added, "seems on the point of undergoing, within the ensuing twenty-four years [from about 1830], a remarkable change similar to that of which *γ* Virginis has already furnished a striking instance during the last century, and passing from a distant double star of the second class to a close one of the first, and ultimately to one of extreme closeness and difficulty, such as only the very finest telescopes, with all the improvements we may expect in them, will be capable of showing otherwise than single." But there are some orbital anomalies still in the way.

[The orbit of Castor has been subjected to the careful attention of a large number of experienced observers and computers since Admiral Smyth wrote the foregoing paragraph. A very full statement of the work done is given by Gledhill in the *Handbook of Double Stars.* Suffice it to say here that Thiele's orbit in *Ast. Nach.*, No. 1227, vol. li., appears to be the best yet arrived at. His period is 996^{y}. Moreover it may be mentioned that all the more recent results ascribe to Castor a period much in excess of that assigned by the earlier investigators. For instance, Wilson gives 982^{y}, and Doberck 1001^{y}. I give Thiele's and Doberck's orbits side by side for comparison :—

		Thiele.	Doberck.
π	Longitude of peri-astron		
☊	Longitude of Ascending Node	= 31 58	27 46
λ	Peri-astron from Node on orbit	= 294 0	267 13
γ	Inclination	= 42 5	44 33
ϵ	Eccentricity	= 0·34382	0·3292
n	Mean Annual Motion	= 21·66″	
a	Semi-axis major	= 7·53″ (for 1850)	7·43″ (for 1850)
T	Peri-astron passage	= 1750·326	1749·75
	Period	= 996·85^{yrs}	1001·21^{yrs}

The distance of A B seems to have reached its maximum about 1872, and a diminution is probably now going on.]

Using Herschel's bow, albeit with hardly vigour to bend it, I attempted an orbit of this revolver, notwithstanding I soon found that the values of its annual changes are violently discordant. The projection brought out an ex-centricity of 0·7781, an inclination = 70° 36′, and a period of 240 years; the last condition being obtained by H.'s novel and ingenious process of cutting out the graphic orbit from card-board, and weighing both it and its requisite sectors in a balance. These are the previous angles used :—

	Position.		Epoch.
	°	′	
Bradley and Pound	355	53	1719·84
Bradley and Maskelyne	323	47	1759·80
Herschel, W.	293	3	1783·64
Herschel, W.	284	19	1800·27
Struve	272	52	1813·83
Herschel, J.	270	0	1816·97
Herschel, J., and South	264	59	1823·11

Bradley appears to have made his estimations upon the parallelism of the line of direction of the pair, to that joining Castor and Pollux, in 1759, "at all times of the year," evidently intending to notice whether any annual oscillation might be observed. This induced Roger Long, Lowndes's Professor of Astronomy at Cambridge, to attack Castor with telescopes of 14^{ft} and 17^{ft} in length, with a view to carrying out Galileo's suggestion on parallax; but the prospect of success soon became so hopeless, that he was "persuaded the stars would always be found to appear the same." This gentleman was more happy in the construction of an enormous astronomical machine—the very A^1 of orreries—at Pembroke College. It is a hollow sphere, about eighteen feet in diameter, with its polar axis parallel to the mundane axis, upon which it is readily turned by a winch and rack-work; thus it can be made to revolve, while about 30 persons conveniently attend a scientific lecture in the interior, and contemplate the orderly march of the constellations painted on the moving concavity above them, the stars being pierced through the metal according to the several magnitudes, so that the light penetrates and each assumes a curious radiated, or rather stellated form. This sphere was completed, with considerable expense as well as ingenuity, in 1758; but although £6 per annum is allowed to a keeper, who is generally an undergraduate, it was suffered to fall so much out of order as to mar the projector's intention of popularising astronomy; and many a good man and true has lived and learned in Cambridge, without even being aware of its existence. Of this I could tell a story or two, but shall only add, that it was lately brushed up a bit; and I had the satisfaction of being on its floor with a party of Cambridge *savants* of the first magnitude, in whom the shade of Long must have delighted.

Δίδυμοι, Gemini, Tindaridæ, or Gemelli, is the third constellation of the zodiac, and one of the ancient 48; lying nearly mid-way between Orion and the Great Bear, in a region long viewed as the centre of the heavens. Among the Orientals it was represented as a pair of kids, denoting that part of spring when these animals appear; but the Greeks changed them to two children with their feet on the Galaxy; and the Arabians, whose tenets prohibited the human form in delineations, afterwards altered them to a couple of peacocks. Paulus Venetus, and the early Venetian illustrators of Hyginus, represent them as two winged angels. Among the ancients every sign had its tutelary deity, and Phœbus had charge of Gemini, which gave rise to the astrological jargon about the connection between the sun and this asterism; to the disparagement of the latter, for many inuendos are on record, and we are told, in the manuscript Almanac of 1386, that whoever happens to be born under the aërial triplicity of the Twins, shall be "ryght pore and wayke, and lyf in mykul tribulacion."

Astronomers, however, view it in a different light; for though it is not splendidly conspicuous nor thickly studded, it is fine, and contains bright individuals, which, with its numerous double stars, clusters, and nebulæ, render it interesting and important; and, from its being the sign of St. Paul's ship, we see that it was esteemed propitious by ancient mariners. It has been thus tabulated:—

Ptolemy . . .	25 stars.	Bayer	33 stars.
Copernicus . .	25 „	Hevelius . . .	38 „
Tycho Brahé .	29 „	Flamsteed . . .	85 „
Kepler . . .	30 „	Bode	190 „

To know this star by alignment is easy, as a ray from β Orionis, led through ε, the middle star of Orion's belt, and under α Orionis, will, at about twice that distance further on, rest upon Castor: or, if taking the poetaster's advice:—

From *gamma* on the Great Bear's flank let a long ray be cast,
Conduct it under Merak's blaze to south-west regions vast;
Across the Lynx to Gemini this line will thus be led,
And carried further on will reach bright Betelgeuze the red.

485. 37 ♅. VIII. PUPPIS. (h. 455; H. 1545.)

	h.	m.	s.				s.
R. A.	7	28	10	Prec.	+		2·73
		°	′				″
Decl.	S	15	12·5	——	S		7·52

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; P; l C; st 9 &c.;" which means:—"cluster; poor; little compressed; consists of stars from mag. 9 downwards."

486. 52 ♅. VIII. MONOCEROTIS. (H. 1544; B.) CCXCIII.

	h.	m.	s.			s.
R. A.	7	28	12	Prec.	+	2·79
		°	′			″
Decl.	S	12	48·3	——	S	7·54

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	B C 140·2	...	12·4	...	1830·71

The principal star of a loose Galaxy cluster, under the Unicorn, and pointing to a double star in the *np*, on an angle 288° and Δ R. A. 14·5s. A 7, faint yellow; B and C, both 10, and both dusky; the two latter point to a 9th magnitude star preceding them by about 6s, and the field contains the cluster and its outliers, with several 8th magnitudes grouped near the centre. It may be fished up by dropping a line from β Geminorum close by the W. side of Procyon, and extending it 19° to the S., where it stands 12° E.N.E. of Sirius. [B C form Σ. 1115.]

487. 149 P. VII. PUPPIS. CCXCIV.

		h.	m.	s.				s.
R. A.		7	29	40	Prec.	+		2·54
			°	′				″
Decl.	S	23	14·1		——	S		7·64

	Position.		Distance.		Epoch.
	°		″		
South	284·9	...	9·0	...	1825·01
Secchi	108·8	...	8·7	...	1856·2
Stone, O.	107·9	...	9·0	...	1879·1

A neat double star in the Galaxy, over the aplustre of the Argo's poop; where a line sent from β Geminorum through Procyon, and 28° beyond, will hit it; as will a cross line from Orion's sword-cluster carried through Sirius, and 14° into the S.E. quarter. A and B, both 6, and both topaz-tinted.

[Webb notes the *p* star to be the larger of the two.]

488. 38 H. VIII. PUPPIS. (h. 459, 3088; H. 1551; Star = Σ. 1121.) CCXCVI.

		h.	m.	s.				s.
R. A.		7	31	33	Prec.	+		2·76
			°	′				″
Decl.	S	14	14·3		——	S		7·80

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	300·2	...	6·5 ±	...	1782·78
Struve, W.	304·7	...	7·4	...	1831·44
Smyth	303·8	...	8·0	...	1834·21
Stone, O.	304·4	...	7·3	...	1878·65

A double star in a loose cluster of the Milky Way, over the Argo's stern; and one of those seized by Bode to make his Officina Typographica. A 7½, and B 8, both bright bluish white. It inhabits a very splendid field of large and small stars, disposed somewhat in a lozenge-shape, and preceded by a 7th magnitude with a companion about 20″ *nf* it. A is otherwise known as 34 Officinæ Typographicæ.

To fish this object up, run a line about 12° E. by N. from Sirius, and intersect it by another from β Geminorum through Procyon, and continued 20° lower down. It is in a very rich vicinity.

489. — CARINÆ. (*h. 3984.)

		h.	m.	s.				s.
R. A.		7	31	35	Prec.	+		1·32
			°	′				″
Decl.	S	54	55·8		——	S		7·80

		Position.		Distance.		Epoch.
		°		″		
Herschel, J.	A B	317·3	...	15 *est.*	...	1835·16
	A C	258·0	...	64·5	...	1837·54

A triple star. A 7; B 14; C 8.

490. 1 H̥. VI. GEMINORUM. (h. 458; H. 1549; Ɍ.) CCXCV.

		h.	m.	s.			s.
R. A.		7	31	55	Prec.	+	3·57
		°	′				″
Decl.	N	21	49·3		——	S	7·90

A compressed cluster under the left shoulder of Pollux; and rather more than one-third of the distance from β Geminorum to β Canis Minoris, following δ Geminorum nearly on the parallel, at about 4°. This was described by H̥. as a "beautiful cluster of many large and compressed small stars, about 12′ in diameter." My telescope only shows a faint mass of very small stars, inclining from *sp* to *nf*, but of indistinct figure, the objects being from the 10th to the 16th magnitude.

[Sir W. Herschel's diameter would seem to have been exaggerated, for at Parsonstown it was only described as "perhaps 5′ or 6′ in diameter."]

491. α CANIS MINORIS. CCXCVIII.

		h.	m.	s.			s.
R. A.		7	33	33	Prec.	+	3·19
		°	′				″
Decl.	N	5	30·5		——	S	7·96

A *Nautical Almanac* star with companions, on the loins of the Lesser Dog. A 1½, yellowish white. A is a splendid star, though very considerably less bright than Sirius, which accounts for the latter being called the Greater Dog, quite as well as the assigned reason, as to rising time. Authorities have differed as to Procyon's magnitude; Ptolemy and Hevelius designating it 1, Tycho Brahé 2, and most of the others 1½.

[Astronomers have detected several companions to Procyon. The oldest is Flamsteed's, observed in 1692. Of the other companions the following particulars are on record :—

		Position.		Distance.		Epoch.
		°		″		
Lamont	A B	262·3	...	56·5	...	1836·7
Romberg	„	294·9	...	45·8	...	1863·2
Newcomb	„	311·8	...	44·5	...	1874·0
Burnham	„	320·7	...	44·7	...	1879·7
Smyth	A C	85·0	...	145	...	1838·8
Powell	„	83·8	...	326·6	...	1855·9
Secchi	„	83·6	...	333·2	...	1856·2
Dembowski	„	81·2	...	342·3	...	1874·2
Flammarion	„	80·5	...	346·5	...	1877·2
Powell	A D	282·1	...	384·3	...	1855·9
Dembowski	„	285·3	...	373·2	...	1877·2
Flamsteed	A E	116	...	588	...	1692
Powell	„	99·7	...	643	...	1860
Dembowski	„	98·5	...	650	...	1874
Flammarion	„	96·8	...	652	...	1877

The nearest star, B, was discovered at the Munich Observatory nearly half a century ago, and independently in later times by Dawes and others. The distance of the Smyth star, like many others of this class in the "Bedford Catalogue," is largely in error, and at one time it was thought to furnish an instance of the disappearance of a star, but the detection of many similar errors on the part of Smyth has rendered this very improbable. This star was found by Bird of Birmingham in 1864 to be a close double star, with a minute distant attendant, of mag. 13.

	Position.		Distance.		Epoch.
	°		″		
DEMBOWSKI C a	182·6	...	0·79	...	1872·90
BURNHAM „	187·6	...	0·86	...	1879·10
BURNHAM C b	335·2	...	36·53	...	1880·18

The distant star, E, is Σ. 1126 (No. 492). The change shown by the measures of all these distant stars is due to the proper motion of Procyon.

Some American observers have suspected other companions to Procyon. The following are particulars of the stars noted at Washington:—

	Position.		Distance.		Epoch.
	°		″		
American A	10	...	6	...	1876·03
American B	36	...	8·8	...	1876·03
American C	50	...	10	...	1876·03

Two more were suspected, one of them at Pos. 325° ± with a distance of 10″.

I pass over O. Struve's "star," found afterwards by its "discoverer" to be a "ghost."

Gledhill, who has gone very fully into the history of Procyon in the *Handbook of Double Stars*, gives a good deal of information which will not be found to square very well with what is stated here, but I have Burnham's authority for all that I have said.]

Hunters after parallax will recollect that this is one of those stars upon which Piazzi bestowed such labour to detect the angle which the mean diameter of the Earth's orbit subtends from them, as related in the xiith volume of the *Italian Society's Memoirs;* and that an infinity of observations induced him to assign 3″ ± as the value of Procyon. It has also a large proper motion in space; which Argelander values at $-0·69''$ in R. A., and $-1·05''$ in Decl.

Canis Minor, though a small asterism, is one of the old 48, and, as well as its *lucida*, was called Προκύων, the precursor-dog, because it appeared in the morning dawn before Sirius: though Jacob Bryant persists that the Greek filched the word from the Egyptian *Pur Cahen.* Hence also its name of *Ante-Canis;* and it was popularly considered as Orion's second hand, or *Canicula.* The Arabians recognised its quality of forerunner to the Dog-star in *al-kelb-al-mutekaddem*, the antecedent dog. The constellation was one of much interest, and the regard of the ancients descended to the astrologers of later ages. "What meteoroscoper," demands old Leonard Digges, "yea, who learned in matters astronomical, noteth not the great effects at the rising of the starre called the *Litel Dogge!*"

This constellation stands to the N.E. of the Greater Dog, so that the Milky Way passes between them; and under Gemini. They were anciently in closer connection, but the intrusion of Monoceros between them, by Hevelius, has parted them. The number of stars given to this asterism, in successive Catalogues, has been as follows:

Ptolemy	2 stars.	Bayer	8 stars.
Hyginus	3 ,,	Hevelius	13 ,,
Tycho Brahé . . .	5 ,,	Flamsteed . . .	14 ,,
Kepler	5 ,,	Bode	55 ,,

Procyon is a member of the magnificent equilateral triangle formed in conjunction with Sirius and α Orionis, as well as a right-angled one with α Orionis and β Geminorum. A perpendicular raised at Sirius to a line drawn from that star to Orion's belt will also pass through Procyon to the northward; or, as the alignment is expressed:

Orion's belt from Taurus' eye, leads down to Sirius bright,
His spreading shoulders guide you East, 'bove Procyon's pleasing light.

492. 170 P. VII. CANIS MINORIS. (Σ. 1126.) CCXCIX.

	h. m. s.		s.
R. A.	7 34 17	Prec. +	3·19
	° ′		″
Decl.	N 5 29·1	—— S	8·14

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	130·7	...	1·40	...	1826·18
SMYTH	132·9	...	1·4	...	1833·22
STRUVE, O.	138·2	...	1·13	...	1850·26
WILSON and SEABROKE	139·9	...	1·59	...	1876·22

A close double star, in a fine vicinity on the loins of the Lesser Dog, closely *sf* Procyon. A 7, white; B 8, ash-coloured, with a minute blue star preceding it about 2′, and another of the 11th magnitude in the *sp* quadrant. This very pretty star resembles η Coronæ, but is smaller; and to see it well, we are directed by Ḥ. to observe it when Procyon is near its meridian altitude. The components of this object are both close and oblique, which may account for the results of the several astrometers being rather discordant. Though a direct and increasing angular motion must be inferred, [the distance seems unchanged in 50 years].

493. 46 Ḥ. VIII. PUPPIS. (H. 1557.) CCC.

	h. m. s.		s.
R. A.	7 34 25	Prec. +	2·72
	° ′		″
Decl.	S 16 7·0	—— S	8·16

A loose cluster outlying the Galaxy, over the Argo's stern, where a ray led from *a* Leporis between *β* Canis Majoris and Sirius, and as far again beyond, will strike upon it; and a line from *a* Geminorum passed $\frac{1}{2}^\circ$ to the W. of Procyon, and extended 22° beyond, also picks it up. It comprises a rich field of scattered stars, with occasional glows of star-dust, so that the magnitudes may range from 9 to 16, and smaller still; and the stragglers run into the S.S.E. quarter, where is the crowded group 47 H. VIII. [=H. 1556]. It was discovered by H. on the last evening of the year 1785.

About a minute preceding this object, and $1\frac{1}{2}^\circ$ to the N., is a small faint cluster, which is probably 87 H. VIII. [H. 1553], described by Sir William as consisting of small stars, and not rich.

[A locality abounding in stars, but I cannot see any "cluster" properly so called."—*Brodie.*]

494. 175 P. VII. PUPPIS. CCCI.

	h. m. s.			s.
R. A.	**7 34 30**	Prec.	+	2·46
	° ′			″
Decl.	**S 26 33·1**	——	S	8·17

	Position.		Distance.		Epoch.
	°		″		
DUNLOP	315·8	...	8·7	...	1826·5
JACOB	318·9	...	10·0	...	1846·2
STONE, O.	318·1	...	9·9	...	1878·2

A neat double star, in the corymbus of the Argo's οὐρὰ, or poop; where it may be picked up by a line from the lowest star in Orion's belt, through Sirius, and 19°, or nearly as far again, beyond. A and B, both $6\frac{1}{2}$, and both topaz-yellow; but the tinge which it exhibited under observation may be owing to its low altitude.

[Webb suggests that these 2 stars are brighter than the components of 170 P. VII. Argo Navis, as if the mags. had been accidentally transposed.]

495. 159 P. VII. CAMELOPARDI. (Σ. 1122.) CCXCVII.

	h. m. s.			s.
R. A.	**7 35 26**	Prec.	+	5·78
	° ′			″
Decl.	**N 65 24·9**	——	S	8·18

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	4·8	...	15·4	...	1830·59
SMYTH	4·7	...	15·6	...	1839·27

A neat double star, in front of the Greater Bear's head; where a line run from *a* Aurigæ through *δ* in Auriga's head, and extended 15° to the N.E., will meet it. A and B, both 8, and both white. In a rich neighbourhood. This is a fine object, and its fixity is established.

496. 46 M. PUPPIS. (h. 463; H. 1564.) CCCII.

		h.	m.	s.			s.
R. A.		7	36	47	Prec.	+	2·75
		°	′				″
Decl.	S	14	27·3		——	S	8·21

	Position.		Distance.		Epoch.
Smyth	90°	...	15″	...	1836·24

A very delicate double star in a fine cluster, outlying the Galaxy, over the Argo's poop. A 8½, and B 11, both pale white. A noble though rather loose assemblage of stars from the 8th to the 13th magnitudes, more than filling the field, especially in length, with power 93; the most compressed part trending *sf* and *np*. This was discovered by Messier in 1769, who considered it as being "rather enveloped in nebulous matter;" this opinion, however, must have arisen from the splendid glow of the mass, for judging from his own remark, it is not likely that he perceived the extremely faint planetary nebula on the N. (39 H̥. IV. =h. 464, 3093; H. 1565). H̥., who observed it in 1786, expressly says, "no connection with the cluster, which is free from nebulosity." Such is my own view on attentively gazing; but the impression left on the *senses*, is that of awful vastness and bewildering distance,—yet inducing the opinion, that those bodies bespangling the vastness of space may differ in magnitude and other attributes.

In the following field there is a coarse pair of 7th magnitude stars, lying *sf* and *np* of each other.

[The planetary nebula mentioned above is "annular" according to the Earl of Rosse and Lassell. Engraved, *Phil. Trans.*, 1850, Pl. xxxviii. Fig. 15; Lassell, *Mem. R. A. S.*, vol. xxiii. Pl. ii. Fig. 5.]

497. 1127 Σ. CAMELOPARDI.

		h.	m.	s.			s.
R. A.		7	36	49	Prec.	+	5·65
		°	′				″
Decl.	N	64	19·0		——	S	8·22

		Position.		Distance.		Epoch.
Struve, W.	A B	340·3°	...	5·2″	...	1830·33
	A C	174·9	...	11·2		

A triple star. A 6½, very white; B 8½, ashy; C 10.

498. 64 ♅. IV. PUPPIS. (h. 3095; H. 1567; ℜ.)

CCCIII.

	h. m. s.		s.
R. A.	**7 36 59**	Prec. +	2·67
Decl.	**S 17 56·6**	—— S	8·24

A bright planetary nebula, pale bluish-white, over the poop, and on an outlying wave of the Milky Way. This fine object exactly precedes a 7th magnitude, and is followed by some small stars, as in the annexed diagram; by which it is very readily identified when fished up.

FIG. 12. 64 ♅. IV. PUPPIS.

This was registered by ♅. in March, 1790, and was only estimated at about 12″ or 15″ in diameter. But the inference from such a supposition is vast! "Granting," says H., "these objects to be equally distant from us with the stars, their real dimensions must be such as would fill, on the lowest computation, the whole orbit of Uranus."

["With power 64, like a dull 8 mag. star: with more power, small, brilliant, undefined, surrounded with a little faint haziness."—*Webb.*]

["Though small this is a bright object."—*Brodie.*]

[Engraved, Lassell, *Mem. R. A. S.*, vol. xxiii. Pl. ii. Fig. 7.]

499. κ GEMINORUM.

CCCIV.

	h. m. s.		s.
R. A.	**7 37 48**	Prec. +	3·63
Decl.	**N 24 39·7**	—— S	8·31

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	229·6	...	6·19	...	1828·27
SMYTH	231·9	...	6·0	...	1838·98
SMYTH	232·3	...	5·8	...	1851·21
DUNÉR	235·7	...	6·39	...	1874·06

A very delicate double star, on the left shoulder of Pollux, and about 3½° to the S. of β. A 4, orange; B 10, pale blue. H. expressly calls the attention of astronomers to this object, on the ground that possibly the *comes* is shining by reflected light

[Possibly in motion. Dembowski thinks B is variable.]

500. β GEMINORUM. CCCV.

	h. m. s.		s.
R. A.	7 38 35	Prec. +	3·73
Decl.	N 28° 17'·5	—— S	8''·36

		Position.	Distance.	Epoch.
HERSCHEL, W.	A C	65°·9	116''·7	1781·90
SOUTH	A C	64·4	132·3	1825·10
	A E	72·7	198·0	
STRUVE, O.	A E	74·4	213·5	1850·71
FLAMMARION	A C	72·1	175·0	1877·08
	A D	90·4	205·5	
	A E	75·2	228·9	
BURNHAM	A B	274·9	43·0	1877·95
	A C	70·9	174·6	1879·73
	A D	90·0	206·3	1879·24
	A E	75·3	229·2	1879·24
	C c	128·0	1·4	1878·15

A *Nautical Almanac* star, in the eye of Pollux. A 2, orange tinge; [for the magnitudes of the other stars Burnham gives:—B $13\frac{1}{2}$; C ? ; D 9·5; E 9; c 13. The pair forming C c (=β 580) were first seen with an $18\frac{1}{2}^{\text{in}}$ refractor, and are very difficult, even with that aperture. The changes in the position of the old companions are due to proper motion.]

This star has been suspected of varying in lustre, since it is recorded as having at times been brighter than Castor, whence Bradley rated it of the 1st magnitude; others have classed it in the 3rd rank; but Ptolemy, Tycho, La Caille, Zach, and all the best authorities, classify it 2. Nor is this the only anomaly of Pollux, for the ancients represented it in colour ὑπόκιῤῥος, *subrufa*, reddish; Lichtenstein says, *Quæ trahit ad æram, et est cerea;* and certainly, in 1832, its tint was as I have mentioned.

This star is well known as Pollux, the brother of Castor; but in the Alphonsine Tables and in other old astronomical works it is called *Ras-al-geuze*, the twin's head, from the doubtful word *jauzá* or *júzá*. Pollux may generally be known by his connection with Castor; but for further identity, a line drawn from the Pleiades through β Tauri on the Bull's horn passes to it.

> If Betelgeuze and Procyon with Pollux bright be cast,
> Amid the glories of the sky, shines a triangle vast;
> To guage with practised studious eye the form that shines afar
> The angle of twice forty-five, shows 'tis rectangular.

501. 93 M. PUPPIS. CCCVII.

	h. m. s.		s.
R. A.	7 39 51	Prec. +	2·54
Decl.	S 23° 36'·1	—— S	8''·48

A small Galaxy cluster, in the aplustre of the Argo's poop; a line from Orion's sword-cluster, led through Sirius, strikes upon it 16° beyond, where it will be intersected by a ray from α Geminorum through Procyon. This neat group is of a star-fish shape, the *sp* portion being the brightest, with individuals of the 7th to the 12th magnitudes: it was first registered by Messier, in 1781, as a mass of small stars.

The unlucky Chevalier d'Angos, of the Grand-Master's observatory at the summit of the palace at Malta, mistook this cluster for a comet: from which, and some still more suspicious assertions, my excellent friend, Baron de Zach, was induced to term any egregious astronomical blunders—*Angosiades.*

502. 3010 Lac. PISCIS VOLANTIS. (*h. 3997.)

R. A.	**7h 39m 55s**	Prec.	+	1s·14
Decl.	**S 74° 1′·7**	——	S	8″·47

	Position.	Distance.	Epoch.
Herschel, J.	100°·8	... 1″·75	... 1836·70

A very close double star. A 8; B 8.

503. π GEMINORUM. (Σ. 1135.) CCCVI.

R. A.	**7h 40m 25s**	Prec.	+	3s·88
Decl.	**N 33° 41′·2**	——	S	8″·56

		Position.	Distance.	Epoch.
Struve, W.	A B	211°·7	... 22″·6	... 1831·25
Smyth	A B	212·5	... 25	... 1839·12
	A C	340·0	... 95	

A most delicate triple star, just above the heads of Gemini; where it is reached by a line from Procyon through β Geminorum, and extended 5½° to the N. A 5½, topaz yellow; B 13, bluish; C 12, dusky.

504. 2 PUPPIS. (Σ. 1138.) CCCVIII.

R. A.	**7h 40m 26s**	Prec.	+	2s·76
Decl.	**S 14° 25′·4**	——	S	8″·52

	Position.	Distance.	Epoch.
Herschel, W.	339°·2	... 17″·3	... 1782·78
Smyth	338·8	... 16·8	... 1836·20
Stone, O.	338·9	... 16·8	... 1838·18

A neat double star over the Argo's stern, where a line from α Leporis through Sirius, and as far again to the E., will meet it intersected by a ray from α Geminorum over Procyon. A 7, silvery white; B 7½, pale white; and another star in the *nf* quadrant.

Its fixity seems to be established.

[Almost in the field with this is 4 Argo Navis, a yellow star of mag. 5.]

505. 201 B. GEMINORUM. (Σ. 1140.)

		h.	m.	s.		s.
R. A.		7	42	0	Prec. +	3·48
		°	′			″
Decl.	N	18	36·5		—— S	8·64

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	273·8	6·1	1829·23

A double star. A 7½, yellow; B 9, very blue.

506. 15219 Lalande PUPPIS.

		h.	m.	s.		s.
R. A.		7	42	45	Prec. +	2·7
		°	′			″
Decl.	S	15	44·5		—— S	8·64

	Position.	Distance.	Epoch.
	°	″	
KNOTT	311·0	127·8	1864·21

Described by Knott as "a fine deep orange coloured pair." A 6½; B 6½. Situated about 1° 20′ S. of 2 Argûs.

507. 5 PUPPIS. (Σ. 1146). CCCIX.

		h.	m.	s.		s.
R. A.		7	42	48	Prec. +	2·82
		°	′			″
Decl.	S	11	55·4		—— S	8·69

	Position.	Distance.	Epoch.
	°	″	
SMYTH	19·0	3·5	1834·11
SEABROKE	15·8	3·7	1874·18
STONE, O.	14·4	3·3	1878·10

A close double star, over the Argo's stern, rather more than 2° N. by E. of No. 504. A 7½, pale yellow; B 9, light blue. [Colour of B uncertain or changeable according to Knott.] This fine object is 55 Officinæ Typographicæ, an asterism which Bode proposed to make by gathering 100 of the *informes* between Sirius and the hind legs of Monoceros, in commemoration of the art of printing.

508. ζ PISCIS VOLANTIS.

		h.	m.	s.			s
R. A.		7	44	32	Prec.	—	0·67
		°	′				″
Decl.	S	72	20·6		——	S	8·84

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	115·0	...	19 est.	...	1836·18
SANTIAGO OBS.	110·9	...	17·9	...	1850·21

A double star. A 5, yellow; B 10, blue.

509. 535 Dunlop PUPPIS. (h. 3103; H. 1593.)

		h.	m.	s.			s
R. A.		7	48	23	Prec.	+	2·13
		°	′				″
Decl.	S	38	15·7		——	S	9·14

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“!! ; Cl; B; Ri; L; l C; st 12;” which means:—“remarkable; a cluster; bright; rich; large; little compressed; stars chiefly of mag. 12.”

510. U GEMINORUM.

		h.	m.	s.			s
R. A.		7	48	33	Prec.	+	3·52
		°	′				″
Decl.	N	22	11·4		——	S	9·15

A well-known variable star discovered by Hind in 1855. The range of magnitude is from 9 to below 13. The period appears to be subject to variations; Schönfeld thinks that it ranges between 70ᵈ and 150ᵈ. Baxendell has found the star hazy towards its minimum.

511. 23 H. VII. PUPPIS. (h. 479, 3107; H. 1601.)

		h.	m.	s.			s
R. A.		7	51	48	Prec.	+	2·39
		°	′				″
Decl.	S	29	46·6		——	S	9·40

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“Cl; pL; cRi; pC; st 11 . . . 13;” which means:—“a cluster; pretty large; considerably rich; pretty compressed; it consists of stars from mags. 11 to 13.”

512. 14 CANIS MINORIS. CCCX.

		h. m. s.		s.
R. A.		7 52 39	Prec. +	3·12
		° ′		″
Decl.	N	2 31·0	—— S	9·46

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	A B 63·6	...	65·4	...	1782·11
Herschel, J., and South	A B 65·7 A C 152·8	... ...	76·0 112·1	...	1822·15
Smyth	A B 64·9 A C 153·4	... ...	75·0 115·0	...	1831·14

A wide triple star on the boundary of the Lesser Dog, and 6° to the S.E. of Procyon, near where the before-mentioned section or slice of Argo penetrates through the Unicorn. A 6, pale white; B 8, bluish; C 9, blue.

The 3rd star was stated to form an angle with the other two, in the *sf*, a little longer than a rectangle.

513. 37 H̦. VI. PUPPIS. (h. 480; H. 1611; 𝔐.) CCCXI.

		h. m. s.		s.
R. A.		7 54 45	Prec. +	2·85
		° ′		″
Decl.	S	10 19·1	—— S	9·72

A compressed cluster of stars, from the 10th to the 16th magnitudes, or even smaller, over the Argo's poop, in a rich vicinity of two or three fields; a line drawn from δ Geminorum over Procyon, and carried exactly as far again into the S.E., will strike upon it. It was described by H̦. as having some of the stars "next to invisible;" and H. considers the most compressed part to be 4′ or 5′ in diameter. In the preceding portion is a very minute double star. [Best with a low power.]

This cluster is more influenced by optical power than many of its class, and is apparently congregated by peculiar principles of attraction, independently of the innumerable outliers scattered around. It therefore offers a province for meditation as well as calculation, and suggests a most sublime conception of the boundless extent of the material universe, in the mysterious vastness which those suns beyond suns, and glorious systems of suns, probably with attendant planetary bodies, unfold! Hervey, *meditating* upon the immensity of the universe, has eloquently observed, "Could we wing our way to the highest apparent star, we should then see other skies expanded, other suns that distribute their inexhaustible beams of day, other stars that gild the alternate night, and other, perhaps nobler, systems established; established in unknown profusion through the boundless regions of space. Nor do the dominions of the GREAT SOVEREIGN end there; even at the end of this vast tour, we find ourselves advanced no farther than the frontiers of Creation, arrived only at the suburbs of the GREAT JEHOVAH's kingdom." This is inserted rather for the intended than the expressed sentiment; for the *alternate nights*, and *frontiers*, and *suburbs*, can only be viewed as the worthy rector's *maniéra di parlare*.

["I cannot call this anything more than a faint mass of star dust or a glow."—*Brodie*. At Parsonstown indications of a spiral tendency have been noticed.]

514. — CARINÆ. (*h. 4032.)

	h. m. s.		s.
R. A.	**7 56 24**	Prec. +	1·82
	° ′		″
Decl.	**S 46 59·7**	—— S	9·76

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	351·4	...	30·4	...	1836·80

A double star. A 7; B 9½. About 2½° preceding γ Argûs, a star of mag. 2.

515. — CARINÆ. (*h. 4030.)

	h. m. s.		s.
R. A.	**7 56 57**	Prec. +	2·06
	° ′		″
Decl.	**S 41 0·3**	—— S	9·80

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	344·9	...	40 *est.*	...	1837·12

A double star. A 7; B 9. Sir J. Herschel's note is as follows:—"Large star white, small rich ruby-coloured approaching to sanguine. Very remarkable."

516. 17 B. CANCRI. (Σ. 1177.)

	h. m. s.		s.
R. A.	**7 58 52**	Prec. +	3·69
	° ′		″
Decl.	**N 27 50·2**	—— S	9·94

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	354·7	...	3·5	...	1828·27
DUNÉR	353·2	...	3·5	...	1871·67

A double star. A 7, very white; B 8, ashy white. Evidently these stars are fixed. The above places are derived from Sir J. Herschel's *General Catalogue*, but the Declination given in Lord Lindsay's edition of Struve (corrected for epoch) is greater than the above by 2·3′.

517. — CARINÆ. (*h. 4038.)

	h.	m.	s.			s.
R. A.	7	58	58	Prec.	+	2·06
	°	′				″
Decl.	S 40	59·0		——	S	9·94

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	345·4	...	29·1	...	1837·04
Santiago Obs.	347·3	...	29·8	...	1852·22

A double star. A 7; B 8½. The Santiago Observers rated the magnitudes at 7½ and 11, and say, "Assuredly there is a greater difference" than Sir J. Herschel states.

518. 30 H. VIII. CARINÆ. (h. 488; H. 1624.)

	h.	m.	s.			s.
R. A.	8	0	42	Prec.	+	2·46
	°	′				″
Decl.	S 37	51·4		——	S	10·08

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; p Ri; l C; st 10...15;" which means:—"a cluster; very large; pretty rich; little compressed; its stars range from mag. 10 to mag. 15."

519. 1183 Σ. MONOCEROTIS.

	h.	m.	s.			s.
R. A.	8	1	9	Prec.	+	2·89
	°	′				″
Decl.	S 8	56·0		——	S	10·11

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	326·2	...	30·9	...	1831·25

A double star. A 6, yellowish white; B 8½, white.

520. ι ARGÛS. CCCXIV.

	h.	m.	s.			s.
R. A.	8	1	52	Prec.	+	2·56
	°	′				″
Decl.	S 23	59·3		——	S	10·28

	Position.		Difference of R.A.		Epoch.
	°		s.		
Smyth	191·0	...	3·8	...	1833·82

A *Nautical Almanac* star, with a distant companion, in the aplustre of the ship's poop; where an imaginary line from β Orionis, passed close under Sirius, will reach it in the S.E. region, by doubling the distance between those stars. A 3^1, pale yellow; B 10, greyish; other small stars in the field. This star is called *Tureïs*, the *scutulum* or little shield, corresponding to the *ἀσπιδίσκη* of Ptolemy.

Argo is one of the old 48 constellations, occupying a very large space in the Southern Hemisphere, but its lucida, Canopus, as well as most of its more important stars, is always hidden from us. There are sound reasons for assigning the highest antiquity to this grand asterism, though the etymologists are crowding on when they derive the English word canopy, or covering, from Canopus, as hath lately been imprinted: such sages would readily see our "son of a gun" in the Greek *παῖς Γυνῆς* (Dor.) "This constellation," says Sherburne, "*sails* by our meridian at midnight, in January, she being deified for saving deities;" but he takes no notice of a strange peculiarity in the good ship's sailing properties. In the apparent motion of the sidereal system this constellation actually dips stern foremost, as Aratus remarked, but which the old scholiast, whoever he is, assures us does not *really* set before the prow.

Owing to the great extent of this constellation, it is subdivided into four departments,—the hull, the keel, the stern, and the sail,—Argo *navis, carinâ, puppi, velis.* Ptolemy assigned 45 stars to Ἀργὼ; but as a large portion could never be observed in our hemisphere, the number continued small till Bode made it amount to 540, by gathering all those observed by Halley, La Caille, and other southern observers. My friend Sir T. Brisbane, however, registered no fewer than 1330 stars in Argo; and as the Via Lactea sweeps directly across it, there is yet a rich harvest for astronomers.

521. 11 CANCRI. (Σ. 1186.) CCCXII.

	h.	m.	s.			s.
R. A.	8	2	6	Prec.	+	3·68
	°	′				″
Decl.	N 27	48·0		——	S	10·19

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	218·9	...	3·18	...	1828·26
Smyth	213·5	...	3·2	...	1839·70
Talmage	219·1	...	3·05	...	1874·23

A close double star, between the head of Pollux and the preceding claw of Cancer; following the former nearly on the parallel, at about 5½° distance. A 7, pale yellow; B 12, lilac. This delicate object is not 11 H̥. I., as supposed by H. and S., who mistook for it a very neat double star about 3′ preceding, and a little N. of the parallel. On the arrival of the Dorpat Catalogue, it was found that Σ. had observed both; 11 H̥. I. being Σ.'s 1177; and the one before us, his No. 1186.

522. 29 MONOCEROTIS. (Σ. 1190.) CCCXIII.

	h.	m.	s.			s.
R. A.	8	3	4	Prec.	+	3·02
	°	′				″
Decl.	S	2	39·7	——	S	10·26

		Position.	Distance.	Epoch.
		°	″	
Herschel, W.	A B	105·2	29·9	1782·80
Smyth	A B	104·7	30·0	1832·14
	A C	243·8	66·9	
Jedrzejewicz	A B	104·7	31·6	1877·72
	A C	244·8	67·0	

A delicate triple star, on the Unicorn's flank; it is about 11° S.E. of Procyon, which is the last of the splendid host that adorns the three preceding hours. A 5½, light yellow; B [10], grey; C 9, pale blue, apparently the *comes* mentioned by Piazzi, Nota 316, Hora VII., "5ˢ temporis præcedit ad austrum." A and C point to a distant star of the 8th magnitude; and there are several companions in the field, of which one in the *nf* is coarsely double.

The small star B escaped detection with the instruments of H. and S.; but their measure of C, together with the observations of Σ. on the three, compared with my own, indicate that no appreciable motion occurred in half a century.

[Webb remarks of B, "can it be variable?"]

523. 11 H̥. VII. PUPPIS. (h. 3114; H. 1630.) CCCXVI.

	h.	m.	s.			s.
R. A.	8	5	31	Prec.	+	2·82
	°	′				″
Decl.	S	12	32·0	——	S	10·44

A compressed cluster, in the space under the haunches of Monoceros, where a line from Arneb drawn through Sirius, and extended rather more than as far again to the E., will find it as the Eastern point of a triangle, equilateral with Sirius and Procyon. It consists of a large and loose, but rich, group of small stars pretty equally strewed over the field, with a close double star in the middle, and a bright yellow one of the 6th magnitude to the *sf*.

524. ζ CANCRI. (Σ. 1196.) CCCXV.

	h.	m.	s.		
R. A.	8	5	54	Prec. +	3·44 s.
	°	′			
Decl. N	18	0·9		—— S	10·47 ″

		Position.		Distance.		Epoch.
		°		″		
Herschel, J.	A B	35·6	...	1·01	...	1830·44
	A C	155·9	...	5·35		
Smyth	A B	355·1	...	1·2	...	1843·11
	A C	147·2	...	5·0		
Dembowski	A B	306·4	...	1·0	...	1855·87
	A C	140·0	...	5·63		
Struve, O.	A B	267·5	...	0·74	...	1862·31
	A C	144·2	...	4·95		
Schiaparelli	A B	108·1	...	0·81	...	1877·18
	A C	130·6	...	5·26		
Jedrzejewicz	A B	89·8	...	0·8	...	1880·22
	A C	131·8	...	5·29		

A fine triple star, just below the after-claws of the Crab, where a shot from α Geminorum through β, carried twice that distance to the S.S.E., will strike it ; or it may be found by a ray from Sirius through Procyon extended to half their distance beyond. But there is much shade on the authority which designates it *Tegmine.* A 6, yellow ; B 7, orange tinge ; C 7½, yellowish. This is a very interesting physical object : an extraordinary retrograde motion is exhibited by it.

This curious and very interesting object has occasioned no little discussion, since Ⱨ. pronounced it to be a "most minute treble star," and more than forty years afterwards H. and S. had declared A and B to be one—"beautifully defined and round." But Sir J. South on a second trial saw A "unquestionably elongated," whence a supposition arose that the star B had come from behind A. Up to 1830, a *direct* motion of + 1·25° per annum was assigned to the star B; whereas from the accurate measures of Sir John Herschel and Mr. Dawes, it was afterwards considered to have a *retrograde* one to the surprising mean amount of −6° 51′. I devoted my best powers to it, and though the near object is difficult from convergence, I was able to assign considerable weights to the results : and from them I drew a scheme of the interpolated positions, angular velocities, and projected distances. Hence it follows, that the two close stars perform a binary revolution in about 60 years, while the outer one accomplishes a grand orbital ellipse in 500 or 600 years. Sir J. Herschel thought, that an entire revolution would have occurred from the epoch of his father's observation to the end of March, 1837, in a periodic time of 55·34 years; which, though not precisely confirmed by me, will be seen to meet the remarkable phenomenon as nearly as the present sidereal knowledge has advanced. "If this be really a TERNARY system," said Sir John, "connected by the mutual attraction of its parts, its perturbations will present one of the most intricate problems in physical astronomy."

[During the past 40 years ζ Cancri has been assiduously observed by a great number of astronomers, and much effort has been made to enlarge our knowledge of its motions. These have been found anomalous and complicated beyond precedent. It seems quite clear however that B revolves round A with a retrograde motion in about 58 years, whilst C revolves round A and B jointly with a direct motion in probably 600 or 700 years. As regards the period of AB, Mädler, Winnecke, and W. E. Plummer all concur in making it 58 years, but O. Struve enlarges it to 62.

Plummer's elements based on Winnecke's are:—

Peri-astron passage . . . . . T = 1872·44
Longitude of Peri-astron . . . π = 171° 46′
Longitude of Ascending Node . . ☊ = 150° 17′
Inclination . . . . . . γ = 36° 14′
Eccentricity . . . . . . ϵ = 0·30230
Mean annual motion . . . n = 2·56′
Semi-axis major . . . . a = 0·90″
Period . . . . = 58·23 yrs.

525. K PUPPIS.

	h. m. s.		
R. A.	8 6 4	Prec. +	2·03 s.
Decl.	S 42° 18′·4	—— S	10″·49

	Position.	Distance.	Epoch.
HERSCHEL, J.	80°·5	5″·9	1836·03

A double star. A 7; B 8½.

526. γ ARGÛS.

	h. m. s.		
R. A.	8 6 8	Prec. +	1·85 s.
Decl.	S 47° 0′·4	—— S	10″·49

		Position.	Distance.	Epoch.
HERSCHEL, J.	A B	220°·2	41″·1	1835·10
	A C	151·6	62·4	
	B C	111·8	*not stated*	
SANTIAGO OBS.	A B	220·4	41·8	1851·15
	A C	147·5	62·9	
	A D	140·5	94·2	

A multiple star. A 2; B 6; C 8; and besides these there are 3 other stars of mags. 11, 11, and 13. "Arranged in an exact right line."—(*Sir J. Herschel.*)

The Santiago D is rated at mag. 10. The Santiago observers say:—"The cluster deserves special attention for its evident changes since H.'s observations."

527. 411 Dunlop PUPPIS. (h. 3117; H. 1636.)

	h.	m.	s.			s.
R. A.	8	7	25	Prec.	+	1·77
Decl.	S	48°	56′·3	——	S	10″·58

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; L; l C; st 7 . . . 16;" which means:—"a cluster; bright; large; little compressed; its stars vary from the 7th to the 16th magnitudes."

528. 13 P. VIII. CANCRI. (Σ. 1202.) CCCXVII.

	h.	m.	s.			s.
R. A.	8	7	32	Prec.	+	3·30
Decl.	N	11°	11′·0	——	S	10″·56

	Position.		Distance.		Epoch.
STRUVE, W.	335°·9	...	2″·35	...	1829·55
MÄDLER	333·6	...	2·57	...	1844·21
SECCHI	325·5	...	2·07	...	1856·17
GLEDHILL	325·5	...	2·1	...	1874·10

A close double star, over the Crab's southern leg; where a line from the upper star in Orion's belt passed under β Canis Minoris, and extended 12° beyond, will find it. A 7½, lucid white; B 12, pale grey,—and there are several distant stars in the *sf* quadrant, with one in the *np* nearly pointed upon by a line through A and B.

[On the whole there seem some slight indications of retrograde motion, but the measures are very conflicting.]

529. 563 Dunlop PUPPIS. (h. 3116; H. 1635.)

	h.	m.	s.			s.
R. A.	8	7	32	Prec.	+	2·21
Decl.	S	37°	3′·7	——	S	10″·59

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; L; l C; i E; st 9 . . . 12;" which means:—"a cluster; bright; large; little compressed; irregularly extended; consists of stars from mag. 9 to mag. 12."

530. ε PISCIS VOLANTIS.

		h.	m.	s.		s.
R. A.		8	7	35	Prec. +	0·24
Decl.	S	68°	18·2′		—— S	10·60″

	Position.	Distance.	Epoch.
Herschel, J.	23·2°	6·7″	1835·01
Santiago Obs.	33·0	5·0	1850·25

A double star. A 5½; B 9½.

531. 22 ♅. VI. MONOCEROTIS. (h. 496; H. 1637; Ꞧ.) CCCXVIII.

		h.	m.	s.		s.
R. A.		8	8	8	Prec. +	2·96
Decl.	S	5°	28·0′		—— S	10·70″

	Position.	Distance.	Epoch.
Burnham	206·3°	6·9″	1880·03

A neat but minute double star, in a tolerably compressed cluster on the Unicorn's flank, and lying 14° S.E. of Procyon. A 9½, and B 10, both white. This object is in the midst of a splendid group, in a rich splashy region of stragglers, which fills the field of view, and has several small pairs, chiefly of the 9th magnitude.

532. r PUPPIS. (*h. 4058.)

		h.	m.	s.		s.
R. A.		8	9	21	Prec. +	2·26
Decl.	S	35°	33·9′		—— S	10·74″

	Position.	Distance.	Epoch.
Herschel, J.	190° *est.*	4″ *est.*	1838·07

A double star. A 6; B 7.

533. 67 P. VIII. CANCRI. CCCXXII.

		h.	m.	s.		s.
R. A.		8	20	1	Prec. +	3·23
Decl.	N	7°	55·4′		—— S	11·51″

	Position.	Distance.	Epoch.
Herschel, W.	325·0°	35·4″	1782·85
Smyth	328·0	35·0	1837·92
Burnham	342·2	31·9	1880·03

A white double star, on the Crab's hindmost right leg; it may be found by running a line from the centre of Orion's belt through Procyon and 14°, or half as far again, beyond. A 6, pearl white; B 13, violet, with a glimpse star preceding it.

534. υ^1 CANCRI. (Σ. 1224.) CCCXXI.

	h. m. s.		
R. A.	8 20 7	Prec. +	s. 3·58
Decl.	N 24° 53'·8	—— S	″ 11·52

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	37·8	...	6·04	...	1822·12
SMYTH	40·1	...	5·8	...	1843·18
MÄDLER	40·7	...	5·59	...	1856·27
WILSON and SEABROKE	41·6	...	5·9	...	1874·18
JEDRZEJEWICZ	42·2	...	5·8	...	1880·25

A neat double star on the Crab's northern middle leg; where a line carried from Sirius through Procyon, and extended rather more than as far again into the N.E., will reach it. A 7, pale white; B 7½, greyish. From a comparison with the measures of H. it was inferred that a retrograde annual angular motion of −0·51° had taken place. The subsequent observations, however, of Struve, Sir J. Herschel, and myself, afford no support to this supposed rotation; consequently some error must exist in H.'s register.

[If there is any change at all it would seem to be one of increase in the angle. W. Struve, Dembowski, and Webb all note a much greater disparity in the magnitudes than Smyth's statement implies. Knott, on the other hand, makes them *less* unequal.]

535. ϕ^2 CANCRI. (Σ. 1223.) CCCXX.

	h. m. s.		
R. A.	8 20 8	Prec. +	s. 3·64
Decl.	N 27° 17'·7	—— S	″ 11·52

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	213·3	...	5·50	...	1782·09
STRUVE, W.	212·0	...	4·56	...	1829·45
MÄDLER	214·4	...	4·99	...	1853·59
STRUVE, O.	215·0	...	5·01	...	1874·27
JEDRZEJEWICZ	215·3	...	4·84	...	1880·20

A close double star, above the Crab's northern legs. A 6, and B 6½, both silvery white. [Knott and Dembowski make them both equal and of mag. 6.] The substantial agreement of all the measures indicates its fixity.

536. 72 P. VIII. PUPPIS. CCCXXIII.

		h. m. s.			s.
R. A.		8 20 18	Prec.	+	2·59
		° ′			″
Decl.	S	23 41·3	——	S	11·52

	Position.		Distance.		Epoch.
	°		″		
South	85·0	...	40·6	...	1825·16
Smyth	85·4	...	45·0	...	1830·83
Main	86·5	...	41·9	...	1863·2

A coarse double star, close upon the compass with which the moderns have furnished the Argo. A 6, red; B 9½, green. A ray from β Orionis passed below Sirius, and extended 25° to the E.S.E. (rather more than as far again), will pick it up. The observations yield evidence of fixity.

537. 1228 Σ. CANCRI.

		h. m. s.			s.
R. A.		8 20 58	Prec.	+	3·66
		° ′			″
Decl.	N	27 55·6	——	S	11·57

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	352·0	...	8·9	...	1828·28

A double star. A 8½, very white; B 9, very white.

538. 81 P. VIII. MONOCEROTIS. (Σ. 1233.) CCCXXIV.

		h. m. s.			s.
R. A.		8 22 6	Prec.	+	2·02
		° ′			″
Decl.	S	2 9·2	——	S	11·66

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	331·5	...	18·2	...	1828·71
Burnham	331·1	...	17·9	...	1880·03

A very delicate double star, at the root of the Unicorn's tail; lying about 15° to the S.E. of Procyon, on the line formed by that star and ζ Tauri, at the tip of the Bull's southern horn. A 7, pale topaz tint; B 11, violet; other stars in the field, of which the brightest and nearest is in the *sp* quadrant, near the vertical.

539. θ CANCRI. CCCXXV.

	h.	m.	s.			s.
R. A.	8	25	20	Prec.	+	3·43
		°	′			″
Decl.	N	18	28·1	——	S	11·89

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	61·3	60	1830 ±
Knott	59·3	58·4	1862·31
Burnham	59·5	60·7	1880·05

A star with a distant companion, in the middle of the Crab's body. A 5½, yellow; B 9, grey, and there are 4 other stars in the preceding part of the field, the nearest of which is of the 8th magnitude, and about 75″ distant. [Knott found B much smaller than Smyth states; say 12. But Sir J. Herschel agreed with Smyth, nearly. Knott suggests therefore that B should be watched.] An imagined line from Sirius passed 3° E. of Procyon, and extended nearly as far again to the N.E., will readily fish the object up.

540. A VELORUM. (*h. 4104.)

	h.	m.	s.			s.
R. A.	8	25	35	Prec.	+	1·89
		°	′			″
Decl.	S	47	33·6	——	S	11·90

		Position.	Distance.	Epoch.
		°	″	
Herschel, J.	A B	242·3	4·4	1836·51
	A C	39·9	20·0	1835·76

A triple star. A 6, white; B 9; C 10, blue.

541. 3366 Lac. VELORUM.

	h.	m.	s.			s.
R. A.	8	25	45	Prec.	+	2·02
		°	′			″
Decl.	S	44	21·8	——	S	11·91

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	350·3	5·6	1836·11

A double star. A 6; B 9.

542. 3375 Lac. PUPPIS. (*h. 4107.)

	h.	m.	s.		s.
R. A.	8	27	22	Prec. +	2·21
		°	′		″
Decl.	S	38	42·1	—— S	12·03

		Position.		Distance.		Epoch.
		°		″		
Herschel, J.	A B	325·4	…	3 *est.*	…	1835·99
	A C	98·7	…	30 *est.*		

A triple star. A 7, white; B 10; C 9, plum-coloured.

543. 108 P. VIII. HYDRÆ. (Σ. 1245.) CCCXXVI.

	h.	m.	s.		s.
R. A.	8	30	1	Prec. +	3·20
		°	′		″
Decl.	N	7	0·5	—— S	12·21

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	24·0	…	10·8	…	1822·64
Struve, W.	25·7	…	10·3	…	1832·95
Smyth	25·7	…	10·4	…	1849·13
Main	24·9	…	10·6	…	1862·14

A neat double star, between Hydra's head and Cancer, 1° *np* δ Hydræ, which is the preceding of three nearly equidistant stars in that monster's head, and following Procyon by 16°. A 6, pale yellow; B 7, rose-tint; and there are several glimpse stars in the field, preceded by a 9th magnitude at some distance in the *sp.*

[Called 18 Hydræ by some observers.]

544. 63 H. VII. PYXIS NAUTICA. (h. 516, 3132; H. 1678.) CCCXXIX.

	h.	m.	s.		s.
R. A.	8	32	34	Prec. +	2·47
		°	′		″
Decl.	S	29	33·6	—— S	12·39

A compressed cluster, on the Argo's compass-card. The most gathering portion consists of stars from the 10th to the 15th magnitudes, with a glow of star-dust. The shape is aptly likened by H. to a flattened X. This object lying in a region devoid of large stars, is only to be fished up by running a line from the cluster in Orion's sword over Sirius, and extending it twice as far again into the S.E. region.

The Mariner's Compass is an introduction of La Caille's; and as if the needle and card were not a sufficient anachronism, the classic old Argo was supplied by Bode with a log and line: so 68 stars were constellated from the *informes*, and assigned to *Pyxis Nautica* and *Lochium Funis.*

545. 118 P. VIII. CANCRI. (Σ. 1249 rej.) CCCXXVIII.

	h.	m.	s.		s.
R. A.	8	32	48	Prec. +	3·46
		°	′		″
Decl.	N	20	4·0	—— S	12·40

	Position.	Distance.	Epoch.
	°	″	
South	83·5	57·5	1825·15
Main	84·5	57·2	1863·20

A wide double star, on the Crab's body. A 8, and B 8½, both pale white; a third star in the *np* quadrant, at about 3′ distance. In general alignment, it will be seen about one-third of the distance from Pollux towards Regulus.

546. 124 P. VIII. CANCRI. CCCXXX.

	h.	m.	s.		s.
R. A.	8	33	32	Prec. +	3·46
		°	′		″
Decl.	N	19	56·0	—— S	12·45

		Position.	Distance.	Epoch.
		°	″	
South	A B	157·0	45·0	1825·13
	A C	241·0	92·2	
Main	A B	156·6	45·8	1863·19
	A C	241·7	93·1	

A coarse triple star, on the Crab's body; with an alignment similar to that of 118 P. VIII., before described. A 7, pale yellow; B 7½, dusky; C 6½, lucid white. This, though a wide object, forms a very fair scalene triangle.

547. 44 M. CANCRI. (h. 517; H. 1681.) CCCXXXI.

	h.	m.	s.		s.
R. A.	8	33	55	Prec. +	3·46
		°	′		″
Decl.	N	20	19·4	—— S	12·48

	Position.	Distance.	Epoch.
	°	″	
Smyth	331	150	1831·19

A very wide double star in the well-known cluster called Præsepe, on the Crab's body, enrolled by Messier on his celebrated List in 1769. A 6½, and B 7½, both white, being the *sf* extreme of a wavy line represented by nine small stars.

The Præsepe, metaphorically rendered Bee-hive, is an aggregation of small stars which has long borne the name of a nebula, its components not being separately distinguishable by the naked eye; indeed, before the invention of the telescope, it was the only recognised one, for though that in Andromeda must have been seen, it attracted but little notice till the days of Simon Marius, in 1612. Whereas the Præsepe in Cancer engaged very early speculation ; insomuch that both Aratus and Theophrastus tell us, that its dimness and disappearance during the progressive condensation of the atmosphere were regarded as the first sign of approaching rain. The group is rather scanty in numbers, but splendid from the comparative magnitude of its constituents, which renders it a capital object for trying the light of a telescope. Yet Galileo discovered this cluster to consist of 36 small stars, when it was supposed that there were only 3 *nebulous stars*, which emitted the peculiar light.

A line projected from α Virginis under α Leonis, and about 22° beyond the latter, runs through the Præsepe ; or it may be found by a ray from the Pleiades being brought midway between Procyon and α Geminorum, which will pass over ε, on Castor's knee. A line from α Geminorum through β, and continued about three times the distance between them, also reaches this cluster.

548. 129 P. VIII. CANCRI. (Σ. 1254.) CCCXXXII.

	h.	m.	s.			s.
R. A.	8	34	6	Prec.	+	3·46
		°	′			″
Decl.	N	20	3·5	——	S	12·49

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	53·8	20·5	1831·31
Smyth	53·4	20·5	1839·16
Knott	54·2	*not given*	1862·16

A neat double star close to the Præsepe on the Crab's body ; and the "cloudy Præsepe" group is visible to the inquiring eye, at one-third of the distance between β Geminorum and α Leonis. A 7, golden yellow ; B 10, blue. This object is the southern member of a triangle, and is preceded by 3 pairs of stars, all of which were measured by South.

549. 131 P. VIII. LYNCIS. (Σ. 1258.) CCCXXXIV.

	h.	m.	s.			s.
R. A.	8	35	39	Prec.	+	4·30
		°	′			″
Decl.	N	49	15·6	——	S	12·60

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	331·4	9·6	1830·75
Main	329·5	9·6	1862·37

A neat double star, close to the fore-paw of Ursa Major ; being about

2° W.N.W. of ι, a bright star in that paw. A and B 8½, and both white.

550. 2153 Brisb. CARINÆ. (*h. 4128.)

	h.	m.	s.			s.
R. A.	8	36	51	Prec.	+	1·28
Decl.	S	59°	55′·6	——	S	12″·68

	Position.		Distance.		Epoch.
HERSCHEL, J.	221°·9	...	2″·51	...	1836·66

A double star. A 7½; B 8.

551. δ CANCRI. CCCXXXV.

	h.	m.	s.			s.
R. A.	8	39	26	Prec.	+	3·42
Decl.	N	18°	33′·8	——	S	12″·85

	Position.		Distance.		Epoch.
LAMONT	123°·8	...	27″·9	...	1836·2
BURNHAM	113·9	...	40·9	...	1878·2

A very delicate double star, under the Crab's mouth. A 4½, straw colour; B [12], blue, only seen by glimpses. Situated nearly equatorially between 2 distant stars: I assumed it, from Piazzi, as 4·5 in brightness; but H., in his table of the comparative lustre of the individuals of Cancer, in the *Philosophical Transactions*, classes both it and γ as of the 4th magnitude, a degree in which I should rate them myself. A ray from β Orionis glanced to the N.E. through β Canis Minoris, and carried nearly as far again, will find it at about 2½° S.S.E. of the Præsepe.

δ Cancri is the southernmost of the stars called *Aselli* by the Romans, and ὄνοι by the Greeks; γ Cancri being the northern one; and they may very readily be found by their connexion with the Præsepe, which they closely follow in a line, one to the N. and the other to the S. See 44 M, above. (No. 547.)

Cancer is one of the ancient 48 constellations; but as its lucida is only of the 4th magnitude, it is neither conspicuous nor brilliant, whence it was of old represented of a black colour and without eyes; but Bartschius, in his *Planisphærium Stellarum*, 1661, and some others of still later date, converted it to a lobster. Indeed, mythology even seems to apologise for placing so poor an asterism on the solar railroad, by stating that ox-eyed

Juno exalted the creature, for the inconsiderable service of pinching the toes of Hercules in the Lernæan marsh: whence Columella designates it *Lernæus.* Yet, on the whole, there is scarcely one of the signs of the zodiac that has been the subject of more attention than Cancer, nor scarcely any one better determined. For the reason given under Leo, the Lion and the Crab were assigned as mansions of the sun and moon; and Cancer being also famous, according to Chaldaic and Platonic philosophy, as the supposed gate by which souls descended from heaven into human bodies, it, of course, obtained favour among mythologists. But the astrologers saw nothing but its "watery triplicity," and pronounced that all men born under it shall be short, effeminate, and sickly. The successive enumerations of its component members, as optical means have progressed, are :—

Ptolemy . . .	13 stars.	Kepler	17 stars.
Copernicus . .	13 „	Hevelius	29 „
Tycho Brahé .	15 „	Flamsteed . . .	83 „
Chr. Clavius . .	16 „	Bode	179 „

Cancer, as the summer solstice, introduces the longest day in our hemisphere, and names the North Tropic; for as that "aisword beste," the Crab, walks obliquely, it is figurative of the sun's retrogression on arriving at its greatest northern declination in this sign. (See α^2 Capricorni.) It forms the fourth of the zodiacal signs, and designates one of the quadrants of the ecliptic. In the fine copy of Albumazar's *Introductio in Astronomiam*, 1489, in the Bibliotheca Lambethana, Cancer is represented as a large Crayfish; and in Lubienietzki's *Theatrum Cometicum*, 1667, it is figured as a huge lobster, between the tail of which and Gemini is a small shrimp-like companion, designated Cancer Minor.

552. 160 P. VIII. HYDRÆ. (Σ. 1270.) CCCXXXVII.

R. A.	8h 39m 47s	Prec.	+	3s·03
Decl.	S 2° 12′·0	——	S	12″·87

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	259·0	...	4·7	...	1830·98
Smyth	258·9	...	4·9	...	1833·08
Stone, O.	260·5	...	4·6	...	1879·10

A neat double star, in the space interposed between Hydra's head and the Unicorn's tail. A 7, silvery white; B 8, smalt blue. In R.A. it slightly precedes ϵ Hydræ, the middle star in that creature's head, being 9° to the southward of it, and nearly due S. of the Præsepe.

553. ι CANCRI. (Σ. 1268.) CCCXXXVI.

	h.	m.	s.			s.
R. A.	8	40	3	Prec.	+	3·65
		°	′			″
Decl.	N	29	9·7	——	S	12·89

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	309·9	29·9	1782·11
Struve, W.	307·1	30·4	1828·04
Dunér	307·5	30·3	1872·71
Jedrzejewicz	307·4	30·5	1878·20

A double star, at the end of the Crab's northern claw; Piazzi's No. 158, Hora VIII., erroneously marked υ in the Palermo *Catalogue*. A $5\frac{1}{2}$, pale orange; B 8, clear blue, the colours finely contrasted. A line from ε Geminorum, carried through β, and extended something more than as far again to the E.N.E., will find it; and its identity will be instantly made out by its forming another line to the S.W. with Procyon and Sirius. The several observations show that no material change has occurred.

554. ε HYDRÆ. (Σ. 1273.) CCCXXXVIII.

	h.	m.	s.			s.
R. A.	8	40	57	Prec.	+	3·19
		°	′			″
Decl.	N	6	49·3	——	S	12·95

		Position.	Distance.	Epoch.
		°	″	
Struve, W.	A B	195·5	3·21	1830·60
Dawes	A B	199·2	3·65	1834·00
Smyth	A B	203·2	3·6	1843·14
Secchi	A B	210·0	3·33	1856·19
Plummer	A B	216·7	3·67	1876·73
Burnham	A C	192·0	20·0	1878·60
Jedrzejewicz	A B	223·3	3·34	1880·23

A *Nautical Almanac* star, triple, and the middle one in the head of Hydra. A 4, pale yellow; B $8\frac{1}{2}$, purple; C 13. A long ray from α Orionis brought over Procyon, and carried nearly as far again, finds it about 14° S. of the Præsepe; and nearly midway between β Geminorum and α Hydræ.

Dawes remarked to me, "Indeed, were the small star visible fifty years ago, as it is now, it never could have escaped the scrutinising eye of Sir W. Herschel." On this appeal, my observations were rigidly attended to, and the results corroborate the orbital motion.

[Though the observations are very discordant *inter se*, a fact which Gledhill's table renders very apparent, there can be no doubt that the angle is increasing. The distance seems not to have altered.]

555. 288 H. I. DRACONIS. (h. 520; H. 1691; R.)

R. A.	8h 41m 10s	Prec. +	8s·19
Decl.	N 78° 38′·1	—— S	12″·97

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; c L; l E 90° + ; g, svmb M;" which means:—"very bright; considerably large; a little extended in the direction of 90° with the meridian; gradually, then suddenly much brighter in the middle."

556. δ ARGUS. (*h. 4136.)

R. A.	8h 41m 39s	Prec. +	1s·66
Decl.	S 54° 18′·8	—— S	13″·00

	Position.		Distance.		Epoch.
Herschel, J.	62° *est.*	...	80″ *est.*	...	1835·17

A conspicuous star, mag. 2½, with a distant companion of mag. 11. The difference in R.A. between the 2 stars is 7·0s.

557. 3545 Lac. CARINÆ.

R. A.	8h 42m 30s	Prec. +	1s·43
Decl.	S 58° 19′·3	—— S	13″·06

	Position.		Distance.		Epoch.
Herschel, J.	A B 289°·7	...	4″ *est.*	...	1837·02
	A C 357·3	...	60 *est.*		
	A D 217·6	...	80 *est.*		

A double star, with 2 distant companions, making a coarse quadruple object. A 7; B 7½; C 12; D 12.

558. 67 M. CANCRI. (h. 531; H. 1712; R.) CCCXXXIX.

R. A.	8h 45m 10s	Prec. +	3s·29
Decl.	N 12° 12′·7	—— S	13″·24

A rich but loose cluster, at the root of the Crab's southern claw; where a line from β Orionis through Procyon, into the E.N.E., will find it about 5° N. of ϵ Hydræ. It consists principally of a mass of stars of the 9th and 10th magnitudes, gathered somewhat in the form of a Phrygian cap, followed by a crescent of stragglers. It was first registered by Messier in 1780, and resolved by Sir W. Herschel in 1783. The place here given, though differing largely in R.A. from Messier's, evidently is that of his object. Sir W. Herschel saw above 200 stars at once, in the field of view; with my refractor, of far inferior light, but excellent definition, the object appears as herewith represented.

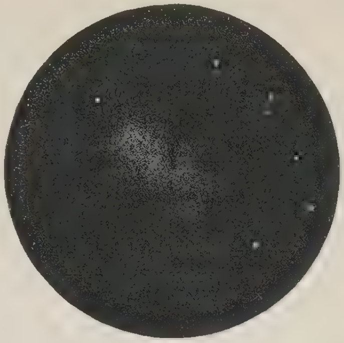

Fig. 13. 67 M. Cancri.

[Visible in finder.]

559. 242. ℍ. I. URSÆ MAJORIS. (h. 530; H. 1711; ℞.)

		h. m. s.			s.
R. A.		8 45 36	Prec.	+	4·35
		° ′			″
Decl.	N	51 43·8	——	S	13·28

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; vg, vsmb M * 10;" which means:—"very bright; large; at first very gradually, then very suddenly brighter in the middle where there is a 10th mag. star."

560. 200 ℍ. I. LEONIS MINORIS. (h. 532; H. 1713; ℞) CCCXL.

		h. m. s.			s.
R. A.		8 45 51	Prec.	+	3·75
		° ′			″
Decl.	N	33 49·7	——	S	13·28

A bright oval nebula, between Lynx and Cancer, but in a confusing gap given to Leo Minor. It trends *nf* and *sp*, with a splendid centre, and is closely followed by a 9th magnitude star, which is in a line with a coarse telescopic pair in the *np* quadrant, and the preceding of a trio in the *sf*. ℍ. with his powerful eye and instrument saw it "very beautiful, 8′ long, and 3′ broad."

This asterism was formed by Hevelius, from 18 *sporades* between Leo of the Zodiac and the Great Bear; the constituents of which were increased by Flamsteed to 53 stars, and by Bode to 96. It was first announced as a constellation in the *Prodromus* of the former, 1691; and the author tells us, that he selected the place in order not to disturb the circles, notions, or rules of astrologers: "Since they esteem the Bear and the Lion as the hottest and fiercest animals, I wished to place there some quadruped of the same nature."

["Scarcely worth the search with $3\frac{3}{4}$in."—*Webb.*]

561. 15 HYDRÆ. CCCXLI.

R. A.	8h 46m 10s	Prec. +	2s·95
Decl.	S 6° 45′·9	—— S	13″·30

		Position.	Distance.	Epoch.
HERSCHEL, W.	A C	340°	43″	1782·99
BURNHAM	A B	158·8	0·46	1878·18
	A C	356·2	45·7	
	A D	52·2	50·0	

A most delicate triple star, between the Unicorn's tail and the first bend of Hydra. A $6\frac{1}{2}$, pearl white; [B $7\frac{1}{2}$]; C 12, D 13, both purplish; other stars in the field. It is located in a region utterly destitute of large stars, to the S. of Hydra's head, being about 12° E. of Cor Hydræ; its place is therefore nearly pointed by a ray passed from β Canis Minoris through Procyon, and carried 6 times as far into the S.E. void.

[AB constitute β 587.]

562. ι² CANCRI. (Σ. 1291.) CCCXLII.

R. A.	8h 47m 32s	Prec. +	3s·68
Decl.	N 30° 59′·8	—— S	13″·39

	Position.	Distance.	Epoch.
HERSCHEL, W.	338°·2	0″·85	1782·27
STRUVE, W.	333·3	1·51	1829·71
DEMBOWSKI	331·0	1·2	1856·19
DUNÉR	332·5	1·43	1871·02
JEDRZEJEWICZ	330·0	1·48	1880·29

A close double star, over the Crab's northern claw. A $5\frac{1}{2}$, white; B 7, yellow. This star is designated ι² by Flamsteed, and he is followed by H̤., H., S. and Σ.; but there is only one star distinguished by that letter in Bayer's Map, which is 48 Cancri, and Piazzi's 158, Hora VIII. To preserve identity it may be mentioned that the object before us is 192 P. VIII; and that Baily has restored the σ in his edition of Flamsteed.

For want of convenient naked-eye stars in this vicinity, the searcher for the point in dispute must remember that it is about 18° E. of and on the parallel of α Geminorum; where its place is sufficiently indicated by a long line drawn up from Sirius in the S.W. and passed over Procyon.

[I have thought it well to go back to the ι and not follow Smyth.]

563. 211 Birm. CANCRI.

	h. m. s.		s.
R. A.	8 49 11	Prec. +	3·39
Decl.	N 17° 39′·0	—— S	13″·50

A red star of mag. 6½. Lalande says "rouge," 6½; Sir J. Herschel at the Cape, "fine red," "brick red" 8½; Birmingham, "colour varying in different degrees of red and orange, 7 to 7½;" Webb, under date of March 5, 1872, "rather pale ruby, 8." The above variations in colour and the varying estimates of magnitude seem to imply variability in this star generally. It deserves to be systematically watched. I do not think that I have seen it myself.

564. 17 HYDRÆ. (Σ. 1295.) CCCXLIII.

	h. m. s.		s.
R. A.	8 50 6	Prec. +	2·94
Decl.	S 7° 33′·0	—— S	13″·39

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	358·6	4·3	1831·59
Smyth	357·8	4·5	1838·12
Smyth	358·5	4·5	1849·21
Stone, O.	358·3	4·2	1878·50

A close double star, between the Unicorn's tail and Hydra's heart. A and B, both 7½, and both white.

To align this object, draw a right angle at Procyon to a line brought from Sirius, and it will meet 17 Hydræ at 11° W. of α Hydræ, or rather a greater distance than that between the two first-named stars.

565. ι URSÆ MAJORIS. CCCXLIV.

	h. m. s.		s.
R. A.	8 51 41	Prec. +	4·18
Decl.	N 48° 28′·4	—— S	13″·43

	Position.	Distance.	Epoch.
	°	″	
Smyth	348·0	12·0	1839·12
Challis	350·0	10·6	1841·19
Mädler	350·7	10·1	1852·27
Struve, O.	356·9	9·7	1871·80

A *Nautical Almanac* star of 1830, double, and in the Great Bear's right fore-paw; where it may be readily identified by shooting a W.S.W. ray from β, the southernmost of the two pointers, which will pass through θ at nearly 12°, then at half that distance further on will strike ι. A 3½, topaz yellow; B [11], purple. There is a star of the 8th magnitude preceding, at an angle = 268·7°, with Δ R.A. = 52·9s.

From strong impressions on his mind, confirmed by what he saw in the Southern Hemisphere, Sir J. Herschel supposed that certain very minute companions to stars may possibly shine by reflected light; and ι Ursæ is one of those instanced as having a dull satellite.

This star has obtained the name of Talita, the third vertebra, the meaning of which is not clear.

[The angle seems increasing and the distance diminishing. The proper motion of this system is however considerable, viz. −0·047s in R.A.; and −0·28″ in Decl.]

566. σ4 CANCRI. (Σ. 1298.) CCCXLV.

	h.	m.	s.			s.
R. A.	**8**	**54**	**40**	Prec.	+	3·70
		°	′			″
Decl.	**N**	**32**	**41·0**	——	S	13·85

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	137·8	4·6	1831·16
Smyth	136·4	4·8	1837·13
Dunér	137·4	4·3	1869·89

A close double star, *nf* the Crab's northern claw. A 6, lucid white; B 9, sky blue. There being some confusion in identifying Bayer's *sigmas*, it is as well to state that this is Piazzi's 226, Hora VIII.; and a ray from Sirius through Procyon, carried nearly double that distance into the N.N.E., will find it.

567. 3667 Lac. VELORUM. (*h. 4165.)

	h.	m.	s.			s.
R.A.	**8**	**58**	**21**	Prec.	+	1·86
		°	′			″
Decl.	**S**	**51**	**45·0**	——	S	14·08

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	87·9	1·4	1837·26

A double star. A 6; B 8.

568. 249 H. I. URSÆ MAJORIS. (h. 550; H. 1750; R.)

	h. m. s.		s.
R. A.	8 58 49	Prec. +	4·79
	° ′		″
Decl. N	60 54·6	—— S	14·11

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c L; E 90° ±; er;" which means:—"considerably bright; considerably large; extended in the direction of 90° or thereabouts with the meridian; easily resolveable." Seen at Parsonstown, March 12, 1852, as "an amorphous mass of nebulosity of uneven character."

569. σ² URSÆ MAJORIS. (Σ. 1306.) CCCXLVI.

	h. m. s.		s.
R. A.	9 0 44	Prec. +	5·42
	° ′		″
Decl. N	67 35·0	—— S	14·23

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	283·0	...	7·9	...	1782·42
STRUVE, W.	263·6	...	4·5	...	1832·14
SMYTH	262·4	...	5·0	...	1835·27
STRUVE, O.	257·5	...	3·8	...	1851·39
DEMBOWSKI	245·2	...	2·6	...	1875·21

A neat double star, in the Bear's forehead. A 5½, flushed white; B 9½, sapphire blue. [The retrograde orbital motion and the diminution in distance are very pronounced.]

There is only one star designated by the letter σ in Bayer's Map: "but," says Baily, in his notes to the *British Catalogue*, "as there may be a doubt whether such letter belongs to 11 Ursæ Majoris, or to the present star, Flamsteed has annexed it to each, which I have therefore retained." It will be easily fished up nearly midway of a line from Polaris to ι Ursæ Majoris, where it is the N.E. vertex of a small triangle formed by the aforesaid two *sigmas* and ρ.

570. 194 B. CANCRI. (Σ. 1311.)

	h. m. s.		s.
R. A.	9 1 7	Prec. +	3·49
	° ′		″
Decl. N	23 24·9	—— S	14·25

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	200·5	...	7·2	...	1831·31
DUNÉR	201·4	...	7·3	...	1870·62

A double star. A 7½, white; B 7½, white. B is rated smaller than

A by Struve, but Struve's fractions of magnitudes cannot be given in the scale which I have adopted generally for my additional objects.

571. 250 ♅. I. URSÆ MAJORIS. (h. 555; H. 1765; 𝕽.)

	h.	m.	s.		s.
R. A.	9	3	2	Prec. +	4·73
		°	′		″
Decl.	N	60	29·2	—— S	14·37

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"cB; cL; lE; psmbMLBN;" which means:—"considerably bright; considerably large; little extended; pretty suddenly much brighter in the middle so as to exhibit a bright nucleus." Described at Parsonstown, Jan. 16, 1852, as a "lenticular ray trending N. and S. and gradually very much brighter in the middle." On Feb. 19, 1868, the following edge was there seen to be more sharply defined than the preceding edge. In the head of the Great Bear about midway between *o* and *v*.

572. 2 ♅. I. HYDRÆ. (h. 564; H. 1771; 𝕽.)

	h.	m.	s.		s.
R. A.	9	4	27	Prec. +	3·19
		°	′		″
Decl.	N	7	29·2	—— S	14·46

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"cB; cL; R; vg, vsmbM; r?" which means:—"considerably bright; considerably large; round; at first very gradually, then very suddenly much brighter in the middle; resolveability uncertain."

573. 66 ♅. I. VELORUM. (h. 569, 3147; H. 1777; 𝕽.)

	h.	m.	s.		s.
R. A.	9	6	15	Prec. +	2·84
		°	′		″
Decl.	S	14	22·2	—— S	14·56

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; pmE 90° ±; psmbM;" which means:—"bright; small; pretty much elongated in the direction of about 90° with the meridian; pretty suddenly much brighter in the middle." Noted at Parsonstown, March 12, 1852, to be "more round than elongated."

574. 167 H. I. LYNCIS. (h. 568; H. 1778; R.)

		h.	m.	s.		s.
R. A.		9	7	11	Prec. +	3·86
Decl.	N		40°	31′·3	—— S	14″·62

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; R; m b MBN;" which means:—"considerably bright; round; much brighter in the middle where it exhibits a bright nucleus."

575. 59 H. I. PYXIS NAUTICÆ. (h. 571, 3148; H. 1780.)

		h.	m.	s.		s.
R. A.		9	7	26	Prec. +	2·67
Decl.	S		23°	43′·9	—— S	14″·63

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; m E 63.7°; g m b M;" which means:—"bright; large; much extended in the direction of 63·7° with the meridian; gradually much brighter in the middle."

576. 3149 h. VELORUM. (H. 1783.)

		h.	m.	s.		s.
R. A.		9	8	18	Prec. +	2·25
Decl.	S		41°	58′·9	—— S	14″·68

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; ○; p B = * 9; v S; R; am st;" which means:—"a remarkable object; planetary; about as bright as a 9th mag. star; very small; round; amongst stars."

577. 3729 Lac. VELORUM. (*h. 4188.)

		h.	m.	s.		s.
R. A.		9	8	26	Prec. +	2·22
Decl.	S		43°	9′·6	—— S	14″·69

	Position.		Distance.		Epoch.
HERSCHEL, J.	286°·9	...	3″·0	...	1835·79

A double star. A $6\frac{1}{2}$; B $7\frac{1}{2}$.

578. θ HYDRÆ. CCCXLVII.

		h.	m.	s.			s.
R. A.		9	8	38	Prec.	+	3·12
			°	′			″
Decl.	N		2	47·1	——	S	14·70

	Position.		Distance.		Epoch.
	°		″		
Burnham	175·0	...	53·1	...	1879·25

A wide double star in the fore part of Hydra's neck. A 4½, pale yellow; B [11], ash-coloured.

This star will be met from the W. by a line drawn from *a* Orionis through Procyon, till it meets another from the N.E., running from δ Leonis through Regulus. The point of intersection is visible enough.

579. 216 ♅. I. URSÆ MAJORIS. (h. 570; H. 1781.)

		h.	m.	s.			s.
R. A.		9	9	12	Prec.	+	5·53
			°	′			″
Decl.	N		69	40·5	——	S	14·74

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; l E 90° ±; mb M; r; v S * sf inv;" which means:—"bright; pretty large; little extended in the direction of about 90° with the meridian; much brighter in the middle; resolveable; there is a very small star involved in the nebula on the *sf* side." At the top of the Bear's head.

580. 265 Dunlop CARINÆ. (h. 3152; H. 1793.)

		h.	m.	s.			s.
R. A.		9	9	45	Prec.	+	1·18
			°	′			″
Decl.	S		64	24·7	——	S	14·77

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; ⊕; v L; e Ri; v g e C M; 45^s d; st. 13...15;" which means:—"a remarkable object; a globular cluster; very large; extremely rich; very gradually becoming extremely condensed in the middle; diameter 45^s in R. A.; the component stars vary from the 13th to the 15th magnitudes."

581. 564 Dunlop PYXIS NAUTICÆ. (h. 3154; H. 1801.)

	h.	m.	s.		s.
R. A.	9	11	33	Prec. +	2·41
		°	′		″
Decl.	S	36	9·3	—— S	14·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; ○ p B; p L; R; v g l b M; in L, C, Cl;" which means:—"a remarkable object; a pretty bright planetary nebula; pretty large; round; very gradually less bright in the middle; in a large condensed cluster."

Engraved, *Cape Obs.*, Pl. v. Fig. 8.

582. 18289 Lalande LYNCIS. (Σ. 1333.)

	h.	m.	s.		s.
R. A.	9	11	39	Prec. +	3·73
		°	′		″
Decl.	N	35	49·2	—— S	14·89

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	39·4	...	1·42	...	1828·59
MÄDLER	42·6	...	1·46	...	1845·51
MORTON	39·2	...	1·44	...	1859·27
DUNÉR	41·4	...	1·45	...	1872·24

A double star. A 7, very white; B 7½, very white.

583. 38 LYNCIS. (Σ. 1334.) CCCXLVIII.

	h.	m.	s.		s.
R. A.	9	12	0	Prec. +	3·76
		°	′		″
Decl.	N	37	16·3	—— S	14·91

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	242·7	...	2·89	...	1822·46
SMYTH	241·6	...	2·8	...	1832·35
MÄDLER	241·7	...	2·62	...	1854·30
GLEDHILL	238·6	...	2·92	...	1874·18
JEDRZEJEWICZ	237·9	...	2·95	...	1880·27

A close double star, in the animal's tail. A 4, silvery white; B 7½, lilac.

It is to be found where a line from α Leonis, carried over ε Leonis, and 23° further to the N.N.W., meets another from ζ and γ Ursæ Majoris.

584. 113 H̥. I LYNCIS. (h. 582; H. 1811; R.)

		h. m. s.			s.
R. A.		9 13 3	Prec.	+	3·68
Decl.	N	° ′ 34 13·0	——	S	″ 14·96

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c L; l E; m b f; 3 st s;" which means:—"considerably bright; considerably large; little extended; much brighter on the following side; there are 3 stars on the S. side."

585. 40 LYNCIS.

		h. m. s.			s.
R. A.		9 13 51	Prec.	+	3·69
Decl.	N	° ′ 34 49·5	——	S	″ 15·01

A fine red or orange star of mag. 4, with a 8 or 9 mag. companion, "violet" (Webb). Birmingham rates 40 Lyncis at mag. 3·1, but I find no other authority for that rating.

586. 157 B. LYNCIS. (Σ. 1338.)

		h. m. s.			s.
R. A.		9 14 7	Prec.	+	3·80
Decl.	N	° ′ 38 39·1	——	S	″ 15·0

	Position. °		Distance. ″		Epoch.
Struve, W.	121·1	...	1·76	...	1829·53
Struve, O.	128·1	...	1·82	...	1840·33
Dawes	131·9	...	1·69	...	1850·12
Dempowski	138·8	...	1·73	...	1862·85
Talmage	142·6	...	1·58	...	1871·40
Wilson and Seabroke	150·0	...	1·78	...	1876·26

A binary star. A 7½, white; B 8, white. The increase in angle is very marked, but the distance seems unchanged. "The apparent orbit is, therefore, probably nearly circular."—(*Gledhill.*)

587. 205 H̥. I. URSÆ MAJORIS. (H. 1823; R.) CCCXLIX.

		h. m. s.			s.
R. A.		9 14 24	Prec.	+	4·19
Decl.	N	° ′ 51 28·1	——	S	″ 15·04

A bright nebula in the animal's right fore-leg, of a pale creamy whiteness, with several bright stars in the northern part of the field. It is large, nucleated, and elliptical, with its major axis lying *np* and *sf*, and about 4′ long. It lies 1½° *sp* of *θ* Ursæ Majoris, and nearly on the line described by *ι*, *θ*, *β*, and *δ* of that constellation.

[Noted at Parsonstown as being "in general appearance very like the nebula in Andromeda."]

588. 39 LYNCIS. (Σ. 1340.) CCCL.

	h.	m.	s.			s.
R. A.	9	15	2	Prec.	+	4·14
		°	′			″
Decl.	N	50	0·7	——	S	15·08

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	318·2	...	7·1	...	1782·87
SMYTH	319·5	...	6·2	...	1839·18

A neat double star, on the Great Bear's right leg, and about 2½° *sp θ* in that constellation; whence, but for the map-makers, it must have pertained to Ursa Major. A 6½, lucid white; B 9, sapphire blue. It has required some trouble to trace unequivocally the identity of this object. Baily diminished its R. A. above 3½′, in order to correspond with modern observations, as there appeared to be some error in the *British Catalogue* reduction of Feb. 16, 1704. Piazzi, Note 47 to Hora IX., says that, by Flamsteed and La Lande, the proper annual motion in R. A. of this star would be − 0·8″, which he vainly tried to confirm from Bradley, who observed it on March 14, 1757; and he therefore concluded that some error of R.A. had crept in here, and at 40 Lyncis.

589. 65 P. IX. HYDRÆ. (Σ. 1347.) CCCLIII.

	h.	m.	s.			s.
R. A.	9	17	32	Prec.	+	3·13
		°	′			″
Decl.	N	3	58·2	——	S	15·22

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	310·5	...	21·2	...	1832·23
MAIN	309·0	...	20·9	...	1863·16

A neat double star, at the back of Hydra's neck; it is 12° N. by W. of *a* Hydræ, and 16° W.S.W. of *a* Leonis. A 8 and B 9, both white.

590. 137 H. I. LYNCIS. (H. 1837; R.) CCCLII.

	h.	m.	s.			s.
R. A.	9	17	36	Prec.	+	3·69
		°	′			″
Decl.	N	34	59·2	——	S	15·23

A bright nebula, on the fore-paws of Leo Minor; a line from *ε* under γ and through λ Ursæ Majoris, carried 16° beyond, marks its site. It is round, pale white, and sparkling at the centre; nearly all the stars in the field precede it, especially a yellow 7th magnitude, which lies on the parallel. This may be liable to error of identity, if H̥. mistook 41 Lyncis for 40. H̥. remarked that the *chevelure*, or additional faint circular nebulosity surrounding the nucleus, was 3′ in diameter: by my equatorial, of course, such a magnitude could not be inferred.

591. 21 URSÆ MAJORIS. (Σ. 1346.) CCCLI.

	h.	m.	s.		s.
R. A.	9	17	51	Prec. +	4·32
		°	′		″
Decl.	N	54	29·3	—— S	15·24

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	309·0	6·4	1822·12
Struve, W.	310·9	5·7	1830·29
Smyth	310·9	6·3	1839·17
Secchi	310·3	5·8	1856 98
Gledhill	312·0	5·3	1874·26

A neat double star, on the Bear's left fore-knee, where an occult line from Polaris to the W. of θ will find it nearly on the parallel of declination with γ Ursæ Majoris. A 8, silvery white; B 9, violet tint, with a third star at a distance in the *np* quadrant.

[A slight increase of angle and decrease of distance is perhaps indicated.]

592. 3163 h. CARINÆ. (h. 3163; H. 1843.)

	h.	m.	s.		s.
R. A.	9	18	18	Prec. +	1·69
		°	′		″
Decl.	S	57	50·6	—— S	15·27

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“!!; ○ = *8; vS; R; *15, 59·13°, 13″;” “which means:—“a very remarkable object; a planetary nebula of the brightness of an 8th mag. star; very small; round; there is a star of the 15th mag. at an angle of 59·13°, and 13″ distant from the centre of the nebula.”

593. 260 H̥. I. URSÆ MAJORIS. (h. 596; H. 1848.)

	h.	m.	s.		s.
R. A.	9	20	56	Prec. +	4·76
		°	′		″
Decl.	N	62	57·9	—— S	15·42

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"B; cS; R; mbM; am st;" which means:—"bright; considerably small; round; much brighter in the middle; amongst stars." It precedes 23 Ursæ Majoris, a star of mag. 4, by 1m 55s, and is 34′ to the S. of it.

594. 41 LYNCIS. CCCLIV.

		h.	m.	s.			s.
R. A.		9	21	27	Prec.	+	3·97
			°	′			″
Decl.		N	46	5·3	——	S	15·44

	Position.	Distance.	Epoch.
	°	″	
South	161·5 ...	86·6 ...	1824·72
Burnham	161·8 ...	81·6 ...	1880·37

A wide pair of stars under the Great Bear's foot. A 6½ and B 8½, both bluish. Classed after Piazzi's magnitudes, though A seems to merit a higher rate.

595. α HYDRÆ. CCCLVI.

		h	m.	s.			s.
R. A.		9	22	11	Prec.	+	2·95
			°	′			″
Decl.		S	8	10·9	——	S	15·49

	Position.	Distance.	Epoch.
	°	″	
Burnham	152·8 ...	281·2 ...	1879·25

A *Nautical Almanac* star, with a distant companion, in Hydra's heart. A 2, but suspected of variability, orange tint; B 10, pale green.

This star has been known as Cor Hydræ, and Lucida Hydræ, among the Latins; and also as Alphard, *i. e.* the Arabic *Al-fard*, the solitary, so termed perhaps, because there is no competitor in brightness near it. It has been most familiarly known as Hydra's heart. It is readily found by drawing a line from γ and δ Ursæ Majoris, the two last in the square—southwards by γ Leonis and through Regulus; or, as expressed in galley-stave heroics:

Thro' Cancer's sign, whence no bright stars distinguish'd light impart,
Pollux from Castor leads you down to hideous Hydra's heart.

Ὕδρος, Hydra, *seu Serpens Aquaticus*, the water-snake, with *Corvus* and the *Crater* upon it, is figured after the same manner in most of the delineations, from the grand Farnese Globe and the MS. of Cicero's Aratus, down to Mr. Carey's maps and Miss Whitwell's drawings. While some term it Hydra, others use the designation Hydros, and a third party Anguis. In addition to these, it has been called Asina, Coluber, Anguis, Sublimatus, Furiosus,—in a word, all manner of names.

It is indeed a strange asterism, trailing to such a length, that but for the subdivisions afforded by the Cup and the Crow, it would seem interminable : the parts so treated become Hydra, Hydra et Crater, Hydra et Corvus, and Hydræ continuatio. The head of the reptile is to the S. of Cancer, from whence its body winds Eastward with many curves, under Leo and Virgo as far as Libra. It was one of the old 48 constellations, and has thus been gradually increased in constituents :

Ptolemy . . .	27 stars.	Bullialdus . . .	33 stars.
Tycho Brahé . .	24 „	Hevelius	31 „
Clavius	34 „	Flamsteed . . .	60 „
Bayer	29 „	Bode	370 „

596. ω LEONIS. (Σ. 1356.) CCCLVII.

R. A.	9h 22m 34s	Prec. +	3s·22
Decl.	N 9° 32′·2	—— S	15″·51

	Position.	Distance.	Epoch.
HERSCHEL, W.	110°·9	0″·4 ?	1783·26
SMYTH	160·0	0·5	1832·11
SMYTH	193·0	0·3	1843·14
MÄDLER	350·0	0·47	1852·30
SECCHI	32·9	0·30	1866·30
DOBERCK	71·2	0·54	1877·21
BURNHAM	79·8	0·51	1879·78

An exquisite close double star, before the Lion's left fore-foot; being one of the "pervicinæ" of Σ. A 6½, pale yellow; B 7½, greenish ; at times both stars look yellow. I am the more particular in stating these colours, as I was drawn to the subject by H.'s remark that it would be curious "if a considerable difference in the colours could have led us to discover which of the two stars is before the other ! But the far greatest part of their diameters being spurious, it is probable that a different coloured light of two stars would join together, where the rays of one extend into those of the other ; and so, producing a third colour by the mixture of it, still leave the question undecided."

To fish up this interesting object by alignment, carry a ray from *a* Geminorum through the Præsepe, and extend it just as far again in the S.E., where it is the middle one of Flamsteed's Nos. 6, 2, and 3 ; it lies in an open space about 11° to the W.S.W. of *a* Leonis, and 17° due N. of *a* Hydræ.

[In taking the above observations H. and Smyth measured one end of the "egg" yielded by the 2 stars in contact, and the other observers the other end of the "egg." Hence it follows that the discordances are not as great as they seem to be. This is undoubtedly a binary star, but the period is uncertain: the latest, and for the present the best, estimate is Doberck's, = 110^{y}. The stars are widening, and after another 20 years a better value will be obtainable.]

597. 3 LEONIS. CCCLVIII.

	h.	m.	s.		s.
R. A.	9	22	38	Prec. +	3·20
		°	′		″
Decl.	N	8	40·2	—— S	15·51

	Position.	Distance.	Epoch.
	°	″	
BURNHAM	79·1	25·1	1878·61

A delicate double star, close to the Lion's left fore-paw, where it will be found by the above alignment. A 6½, pale yellow; B 13, blue, two or three other stars in the field, of which the nearest is about 2′ distant in the *sf*. This object, one of H̶.'s doubles, was looked at by me principally as a focus adjustment for attacking ω, which is within a degree to the due N. of it.

598. 23 URSÆ MAJORIS. (Σ. 1351.) CCCLV.

	h.	m.	s.		s.
R. A.	9	22	51	Prec. +	4·82
		°	′		″
Decl.	N	63	32·6	—— S	15·52

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	272·4	22·8	1830·61
SMYTH	271·8	23·0	1833·26

A neat double star, in the Great Bear's neck; at rather better than one-third the distance between θ and Polaris. A 4, pale white; B 9½, grey.

[This star is known also as *h* Ursæ Majoris. It lies at ⅓ the distance from θ to Polaris.]

599. τ^1 HYDRÆ. CCCLX.

	h.	m.	s.		s.
R. A.	9	23	34	Prec. +	3·03
		°	′		″
Decl.	S	2	17·2	—— S	15·56

	Position.	Distance	Epoch.
	°	″	
HERSCHEL, W.	358·6	61·6	1782·09
SMYTH	2·9	64·9	1831·97
MAIN	2·2	66·2	1863·17

A wide double star, in the Serpent's fore-body, and 6° N. of *a* Hydræ. A 5½, flushed white; B 8½, lilac, with a small star preceding it near the *np* vertical.

600. 56 H. I. LEONIS. (h. 604·1; H. 1861; R.)

	h.	m.	s.			s.
R. A.	9	25	57	Prec.	+	3·41
		°	′			″
Decl.	N	21	58·4	——	S	15·70

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864 :—"c B; v L; E; gmb M; r; sp of 2;" which means :—"considerably bright; very large; extended; gradually much brighter in the middle; resolveable; the *sp* of 2 nebulæ."

The second nebula here spoken of is the next object (No. 601). It is mentioned as "very faint," but "considerably large; round; pretty suddenly brighter in the middle; resolveable." Both are engraved together in *Phil. Trans.*, 1833, Pl. vii. Fig. 70; and *Phil. Trans.*, 1850, Pl. xxxvi. Fig. 3.

601. 57 H. I. LEONIS. (h. 604 2; H. 1863; R.) CCCLXII.

	h.	m.	s.			s.
R. A.	9	25	57	Prec.	+	3·41
		°	′			″
Decl.	N	21	59·1	——	S	15·70

A bright-class white nebula, in the Lion's lower jaw; H. described it as a double nebula, each having a seeming nucleus, with their apparent nebulosities running into each other, and this was confirmed by Sir J. Herschel. It is vertically between two groups, of three small stars each, and it is elongated with a major axis lying *sp* and *nf*. To fish it up, run a line from α to γ, and there draw another, perpendicular to it, which, carried nearly twice the length of the base, will strike it 2° S. of λ Leonis. The upper or S. part is better defined than the lower; it requires, however, the closest attention and most patient watching, to make it a bicentral object, with my means; but the annexed is something of its aspect under the best vision.

FIG. 14. 57 H. I. LEONIS.

[Engraved in *Phil. Trans.*, 1833, Pl. vii. Fig. 70; *Phil. Trans.*, 1850, Pl. xxxvi. Fig. 3.]

602. 6 LEONIS. CCCLXIII.

		h.	m.	s.			s.
R. A.		9	26	4	Prec.	+	3·22
		°	′				″
Decl.	N	10	12·1		——	S	15·70

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	77·0	36·1	1781·14
SMYTH	73·6	37·6	1832·23
DEMBOWSKI	74·3	36·8	1874·05

A double star, in the Lion's left fore-paw; lying 9° W. by S. of *a* on the line projected from *θ* Leonis through that luminary, and at half the length of that line. A 6, pale rose-tint; B 9½, purple.

603. ζ ANTLIÆ.

		h.	m.	s.			s.
R. A.		9	26	4	Prec.	+	2·56
		°	′				″
Decl.	S	31	25·6		——	S	15·70

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	210·6	8·3	1836·22
STONE, O.	211·5	8·2	1877·10

A double star. A 6; B 7.

604. 3917 Lac. VELORUM. (*h. 4220.)

		h.	m.	s.			s.
R. A.		9	29	48	Prec.	+	2·15
		°	′				″
Decl.	S	48	31·1		——	S	15·90

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	202·0	2·99	1836·29

A double star. A 6½; B 7.

605. 7 LEONIS. CCCLXIV.

		h.	m.	s.			s.
R. A.		9	29	52	Prec.	+	3·29
		°	′				″
Decl.	N	14	52·3		——	S	15·90

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	81·4	42·4	1782·10
SMYTH	80·1	42·6	1832·33
HALL	79·5	41·2	1877·30

A wide but very delicate double star, in the space opposite the Lion's neck; it is 8° W.N.W. of *a*, in the line formed by that luminary and *η* Virginis, a bright star lying about twice the distance in the E.S.E. A 6½, flushed white; B 8½, violet tint.

606. 3179 h. CARINÆ. (H. 1881.)

		h.	m.	s.			s.
R.A.		9	31	13	Prec.	+	2·22
		°	′				″
Decl.	S	46	26·9		——	S	15·98

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; e L; v Ri; st L & S;" which means:—"cluster; extremely large; very rich; the stars are of various sizes, large and small."

607. 114 H. I. LEONIS MINORIS. (h. 622; H. 1896; R.)

		h.	m.	s.			s.
R.A.		9	36	21	Prec.	+	3·57
		°	′				″
Decl.	N	32	20·0		——	S	16·25

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; v L; l E; vgb M; p of 2;" which means:—"bright; very large; little extended; very gradually brighter in the middle; the preceding of 2 nebulæ."

The 2nd nebula here spoken of (=491 H. II.; h. 624; H. 1899) is mentioned as "pretty bright; pretty large; little extended; very gradually less bright in the middle."

608. 61 H. I. SEXTANTIS. (h. 630; H. 1904; R.)

		h.	m.	s.			s.
R.A.		9	37	0	Prec.	+	3·03
		°	′				″
Decl.	S	3	12·0		——	S	16·28

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; c S; i R; b M; *9 sp 3^s;" which means:—"bright; considerably small; irregularly round; brighter in the middle; there is a 9th mag. star in the *sp* quadrant at a distance of 3^s."

609. 161 P. IX. SEXTANTIS. (Σ. 1377.) CCCLXVII.

		h.	m.	s.			s.
R.A.		9	37	45	Prec.	+	3·12
		°	′				″
Decl.	N	3	7·9		——	S	16·32

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	142·3	3·3	1830·24
DEMBOWSKI	140·4	3·6	1867·84
STRUVE, O.	145·9	3·7	1868·29

A delicate double star, just inside the upper frame of the Sextant, but also on the more ancient Lion's leg; where it will be found nearly in mid-distance and closely W. of a line between α Leonis and α Hydræ. A 8, yellowish white; B 13, blue, with two or three other small stars in the field, one of which nearly precedes.

610. 285 ♅. I. URSÆ MAJORIS. (h. 625; H. 1905; R.)

R. A.	9h 38m 7s	Prec.	+	5s·05
Decl.	N 68° 25′·5	——	S	16″·33

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; v L; m E 152·4°; st inv;" which means:—"bright; very large; much extended in the direction of 152·4° with the meridian; there is a star involved."

611. 282 ♅. I. DRACONIS. (H. 1906.)

R. A.	9h 38m 51s	Prec.	+	6s·11
Decl.	N 75° 36′·7	——	S	16″·37

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B: p L; i F;" which means:—"considerably bright; pretty large; of irregular figure." Not found by D'Arrest, who suggested that the places of all Sir W. Herschel's nebulæ discovered on April 2, 1801 (this being one of them), were affected by some common and large error.

612. 78 ♅. I. URSÆ MAJORIS. (h. 629; H. 1909.) CCCLXV.

R. A.	9h 40m 32s	Prec.	+	5s·57
Decl.	N 72° 47′·7	——	S	16″·41

A bright-class round nebula, above the Great Bear's ear, with several stars in the field from the 9th to the 12th magnitudes; of which a vertical pair precedes the nebula, and it is closely followed by a very minute one, which is caught only by glimpses. It may be fished up by running a line to the N.E.W. from ζ Ursæ Majoris under λ Draconis, in the tails of the Bear and the Dragon, and carrying till it is nearly due S. of Polaris. Here the observer will find Flamsteed's 27 Ursæ Majoris, a star of the 5½ magnitude, and closely following it is the nebula sought.

613. 50 H. V. ANTLIÆ. (h. 3188; H. 1923.)

	h.	m.	s.			s.
R.A.	9	40	50	Prec.	+	2·62
		°	′			″
Decl.	S	30	41·1	——	S	16·47

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; v F; v L; vg, vsb MN 4″; $19{\cdot}5^s$ d;" which means:—"a remarkable object; very faint; very large; at first very gradually, then very suddenly brighter in the middle, where there is a nucleus 4″ in diameter; the diameter of the nebula as a whole is $19{\cdot}5^s$."

614. R LEONIS.

	h.	m.	s.			s.
R.A.	9	41	39	Prec.	+	3·24
		°	′			″
Decl.	N	11	56·5	——	S	16·52

An old and well-known variable and red star, noted to be variable by Koch in 1782. Range from 5th to 10th mag. Period, 312^d. Criswick, "blood red;" Dunkin, "very red;" Birmingham, 1873, "red, with orange cast." I find it mentioned in my own notes under date of Jan. 20, 1865, as "a fine rich ruby star." Hind says:—"It is one of the most fiery-looking variables on our list—fiery in every stage from maximum to minimum, and is really a fine telescopic object in a dark sky, about the time of greatest brilliancy, when its colour forms a striking contrast with the steady white light of the 6th magnitude, a little to the N." This was written in 1857 (*M. N.*, xvii. 199). This star is B.A.C. 3345.

615. 26 H. V. LEONIS MINORIS. (h. 639; H. 1931; 𝕽.)

	h.	m.	s.			s.
R.A.	9	42	2	Prec.	+	3·58
		°	′			″
Decl.	N	33	55·5	——	S	16·53

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; c B; L; vim E 90°;" which means:—"a remarkable object; considerably bright; large; very irregularly but much extended in the direction of 90° with the meridian."

616. 115 H. I. LEONIS MINORIS. (h. 645; H. 1944; 𝕽.)

	h.	m.	s.			s.
R.A.	9	44	27	Prec.	+	3·58
		°	′			″
Decl.	N	34	4·1	——	S	16·65

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"p B; p S; vl E; mb M; *10 sf 100;" which means:—"pretty bright; pretty small; very little extended; much brighter in the middle; there is a 10th mag. star in the *sf* quadrant at an angle of 100°." D'Arrest places the star differently. He says it follows at 4·4s, in Pos. 141°.

617. 81 and 82 M. URSÆ MAJORIS. (h. 1949 and 1950; ℞.) CCCLXIX.

	h. m. s.		s.
R. A.	**9 46 23**	Prec. +	5·06
	° ′		″
Decl.	**N 69 38·8**	—— S	16·74

No. 81 (=h. 649) is a fine bright oval nebula, of a white colour, in the Great Bear's ear. Its major axis lies *np* and *sf*; and it certainly is brightest in the middle. There are several minute companions in the field, of which a close double star in the *sp* quadrant is Σ. 1386, and by him marked *vicinæ;* the members are both of the 9th magnitude, and trend *np* and *sf*, about 2″ apart, forming a fine though difficult object. [Pos. 294°; Dist. 1·89″; Epoch 1869·15.—*Dembowski.* The angle is slowly decreasing. Somewhat nearer to the nebula, 81 M., is another double, Σ. 1387, formed of two 10th magnitude stars. Pos. 272°; Dist. 9·0″; Epoch 1864·02.—*Knott.*]

With a low power, 82 M. can be brought into the N. part of the same field of view, although they are half a degree apart. It is very long, narrow, and bright, especially at its northern limb, but rather paler than 81 M. A line drawn through three stars in the *sp* to a fourth in the *nf* passes directly through the nebula. The two nebulæ precede λ, in the end of Draco's tail, by 25°, but as the vicinity is deficient of large stars, they are not readily fished up.

The apparent place here taken is that of a small star between the two nebulæ.

[Huggins finds the spectra of both to be continuous.]

[82 M. was described at Parsonstown on May 21, 1871, as "a most extraordinary object, at least 10′ in length and crossed by several dark bands."]

618. 9 SEXTANTIS. CCCLXXI.

	h. m. s.		s.
R. A.	**9 48 22**	Prec. +	3·14
	° ′		″
Decl.	**N 5 27·9**	—— S	16·83

	Position.	Distance.	Epoch.
	°	″	
South	292·7	51·0	1825·01
Main	292·2	53·1	1863·19

A double star on the right fore-leg of Leo, though crimped into the

Sextant; it lies at one-third of the way from *a* Leonis to *a* Hydræ. A 7 and B 9, both blue, and well defined. [Colour of B uncertain or changeable, according to Knott.]

Desirous of assigning an asterism to the perpetual remembrance of celestial affairs, and especially wishing to commemorate the instrument so successfully used by Tycho Brahé at Uranienburg, about the year 1590, Hevelius gathered some *informes* between the Lion's fore-legs and Hydra, and called them *Sextans Uraniæ.* But, with more zeal than taste, he fixed the machine upon the Serpent's back, under the plea that the said Sextant was not in the most convenient situation, but that he placed it between Leo and Hydra because these animals were of a fiery nature, to speak with astrologers, and formed a sort of commemoration of the destruction of his instruments when his house at Dantzic was burnt in September, 1679; or, as he expresses it, when Vulcan overcame Urania. He who thus placed it in the heavens only mustered 12 stars, but Flamsteed made out 41, and Bode increased them to 112. This, and some other of Hevelius's denominations, occasioned an ill-natured and groundless sneer from the redoubtable La Lande, himself a wholesale apotheosizer; but it assuredly speaks more for his flippancy than for his scientific gratitude.

The above ebullition is however to be strictly confined to the case in point; for whatever singularities or failings he possessed—and, from the testimony of his own *camarades*, these were neither few nor trivial—there were not many of his day to whom the "million" were more indebted for scientific supplies than to Jerome Le Français La Lande.

619. 213 P. IX. VELORUM.

	h. m. s.		s.
R.A.	**9 49 58**	Prec. +	2·35
	° ′		″
Decl.	**S 44 45·8**	—— S	16·91

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	239·1	...	5·9	...	1836·15

A double star. A 6; B 9½.

620. 286 H. I. URSÆ MAJORIS. (h. 658; H. 1982; R.) CCCLXXII.

	h. m. s.		s.
R.A.	**9 53 36**	Prec. +	4·92
	° ′		′
Decl.	**N 69 16·3**	—— S	17·08

A bright-class round nebula, at the back of Ursa Major's left ear, preceding λ, at the end of Draco's tail, by 22°; it is lucid white, and lights up in the centre. There are two lines of three stars each across the field, of which the one preceding the nebula is of the 7th magnitude, and that following of the 10th; between these the sky is intensely black, and shows the nebula as if floating in awful and illimitable space, at an inconceivable distance. Dr. Derham, whose judgment led him to consider nebulæ as vast areæ of light "infallibly beyond the fixed stars," thought that some of them might be openings in an opacity surrounding the visible system, which chasms allow us a sight of the empyreal sphere beyond it. The present object, under the favourable conditions in which I viewed it, would have almost countenanced his supposition.

♅. says, that "on the *nf* side there is a faint ray interrupting the roundness."

621. 47 ♅. V. URSÆ MAJORIS. (H. 1983; ℜ.)

		h. m. s.		s.
R. A.		9 54 27	Prec. +	4·12
Decl.	N	56° 13′·0	—— S	17″·12

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; m E 135° ± ;" which means:—"very bright; large; much extended in the direction of about 135° with the meridian."

622. 1402 Σ. URSÆ MAJORIS.

		h. m. s.		s.
R. A.		9 57 31	Prec. +	4·12
Decl.	N	56° 0′·8	—— S	17″·26

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	96·0 ...	21·0 ...	1831·68
Main	98·1 ...	23·5 ...	1864·47

A double star. A 7½, yellow; B 8½, bluish. Midway between β and θ.

623. 297 Dunlop CARINÆ. (h. 3224; H. 2007.)

		h. m. s.		s.
R. A.		9 59 8	Prec. +	1·93
Decl.	S	59° 35′·4	—— S	17″·33

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; e L; l C; B; st 9 ... 14;" which means:—"a cluster; extremely large; little condensed; bright; the component stars vary from the 9th to the 14th magnitudes."

624. 163 ♅. I. SEXTANTIS. (h. 668, 3223; H. 2008; ℜ.) CCCLXXIII.

	h.	m.	s.		s.
R. A.	9	59	45	Prec. +	2·99
Decl.	S	7°	11′·3	—— S	17″·35

An elongated bright nebula, on the radius or graduated limb of the Sextant, followed by two stars of the 11th magnitude, which are the only other objects in the field of view. Its major axis trends towards the vertical of the *sp* and *nf* quadrants; and the extremes appear pointed.

It is remarkable that this object was very clearly distinguished in my telescope; for H. says it was scarcely perceptible in his 20ft when he gave it only 6 inches of aperture. It follows *α* Hydræ by about 10°, a little N. of the parallel; where it precedes a knot of small stars, which are a couple of degrees further to the W.

[Query, variable? Seen without the slightest difficulty in a finder of 2½in by Brodie. Webb notes that it "bears magnifying unusually well."]

625. 3228 h. ANTLIÆ. (H. 2017.)

	h.	m.	s.		s.
R. A.	10	2	23	Prec. +	2·52
Decl.	S	39°	53′·8	—— S	17″·47

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!; ○; vB; vL; lE; *9 M; 4·0s d;" which means:—"a very remarkable object; a planetary nebula; very bright; very large; little extended; resembles a 9th mag. star; it has a diameter of 4·0s in R. A."

Engraved, *Cape Obs.*, Pl. vi. Fig. 9; Lassell, *Mem. R. A. S.* vol. xxiii. Pl ii. Fig. 10; Secchi, *Descrizione del Osserv. Coll. Rom.* 1856, Pl. iv. Fig. 16.

626. *α* LEONIS. CCCLXXIV.

	h.	m.	s.		s.
R. A.	10	2	30	Prec. +	3·20
Decl.	N	12°	30′·3	—— S	17″·47

	Position.		Distance.		Epoch.
HERSCHEL, W.	A B 305°·0	...	168″·3	...	1781·84
HERSCHEL, J., and SOUTH	A B 307·1	...	174·96	...	1821·21
JEDRZEJEWICZ	A B 306·8	...	177·0	...	1877·30
BURNHAM	B C 88·5	...	3·2	...	1878·10

A *Nautical Almanac* star, with a distant companion, in the Lion's breast. A 1, flushed white; B 8½, pale purple; [C ?].

A comparison of the measures of H., and J. Herschel and South, induced a belief, that a considerable alteration had occurred in the relative places of the two stars, in a lapse of 40 years, showing a physical connection between them; but I am inclined rather to attribute the differences to proper motion and instrumental errors, than to inconstancy of angle or increase of distance. Indeed, it is a wide object for this system of measuring, and a long run upon the micrometer spring.

This star is well known as *Καρδία λέοντος*, *Cor Leonis*, the lion's heart. It is pointed to by *α* Tauri and *γ* Geminorum, as well as by running a line from Orion's belt through Procyon, and carrying it nearly twice as far again to the E.N.E. The prolongation of the same line, or rather great circle, will lead to Denebola, *β* in Leo's tail. Regulus and Denebola form the longest side of an extensive quadrilateral figure, with two other stars to the N. of them; there is a still more remarkable square adjoining this, *γ* being a corner-stone of each. Regulus is also readily found by drawing a line southwards from *γ* and *δ* Ursæ Majoris, the last stars in the square; or, with the poetaster, reversing it:

From Hydra's pass through Leo's heart, (which marks th' Ecliptic Line,)
You'll rise to where, in Ursa Great, the third and fourth stars shine.

Ptolemy calls this star Βασιλίσκος, from an opinion of its influencing the affairs of the heavens; whence comes its Latin name Regulus, a word which appears to have been first used by Copernicus as the diminutive of *rex*. It is the lucida of the extensive northern constellation Leo, whose stars are well disposed and conspicuous, forming the 5th asterism in zodiacal order. The classic star-gazers viewed this as the apotheosis of the Nemæan Lion, and the emblem of heat; but Stower's celebrated manuscript Almanac of 1386 recognises in it one of Daniel's lions, and therefore "whoso es born in yat syne he schal be hardy and lytherus." The Arabs called this "fiery trigon" *Kalb-al-Asad*, or lion's heart, and *Meliki*, or kingly; for this impression of greatness was as rife among the Oriental astronomers and their successors as among their classic predecessors. Thus Wyllyam Salysbury, treating of the sphere, or frame of the world, in 1552, tells us, "The Lyon's herte is called of some men the Royall Starre, for they that are borne under it are thought to have a royall nativitie;" and in the *Tabule Astronomice Alfonsi Regis*, 1492, it is written against Regulus, "Que est super cor: et dicit. Rex." Yet after all Horace only sings of it as

Stella vesani Leonis.

Λέων, Leo, Nemeas alumnus, Bacchi sidus, Stella regia, are also names by which the Lion has been designated; and it is visible to the gazer by the large trapezium which it displays. Even should Regulus not be personally known, this trapezium is readily found by the universally-known pointers of the Great Bear; for as they serve to show Polaris to the northward, so also doth the line produced by them, prolonged southward about 45°, point to the Lion. It is one of the old 48 constellated groups, and has been thus catalogued:

Ptolemy . . .	35 stars.	Maraldi . . .	60 stars.
Tycho Brahé . .	40 „	Flamsteed . .	95 „
Bayer	43 „	Hodell . . .	276 „
Hevelius . . .	50 „	Bode	337 „

627. 79 H̥. I. DRACONIS. (h. 674; H. 2024; R.)

	h.	m.	s.			s.
R. A.	10	7	25	Prec.	+	5·28
		°	′			″
Decl.	N	73	56·6	——	S	17·68

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; R; v g, v s v m b M;" which means:—"very bright; large; round; at first very gradually, then very suddenly very much brighter in the middle."

628. 3 H̥. I. SEXTANTIS. (h. 684; H. 2038; R.)

	h.	m.	s.			s.
R. A.	10	8	3	Prec.	+	3·11
		°	′			″
Decl.	N	3	58·3	——	S	17·65

A bright-class round nebula, on the frame of the instrument, thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p S; R; p s m b M; p of 2;" which means:—"bright; pretty small; round; pretty suddenly brighter in the middle; the preceding of 2 nebulæ."

This object was discovered by Sir W. Herschel in December, 1783, but it is very remarkable that, though he made 4 observations of it, he did not notice that there were 2 nebulæ in the field. H., however, saw them both. The place is not very difficult to find, being about 9° S. by E. of α Leonis, and in the line with that luminary and μ Leonis.

Engraved, Rosse, Dublin *Trans.*, 1879, Pl. iii. Fig. 2038.

This object is on or near the spot where the Capuchin, De Rheita, fancied he saw the napkin of S. Veronica, in 1643, with an improved telescope which he had just constructed. In a letter to his friend J. Caramuelis, dated Cologne, 24th April, 1643, he mentions having detected most clearly, by means of his binocular telescope, with the greatest surprise, admiration, and delight, the sacred "sudarium Veronicæ sive faciem Domini maximâ similitudine in astris expressum," in the sign of Leo, between the equinoctial and the zodiacal circles. And this is an accurate reduction of the figure which Zahn gives of it in the *Oculus Artificialis*:—

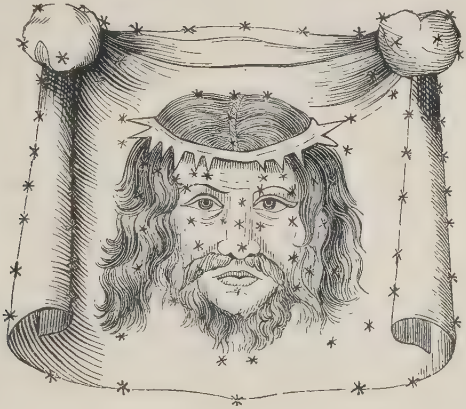

FIG. 15. "A PIOUS FRAUD," A.D. 1643.

Padre de Rheita makes very respectable mention of this same apparition in his great work, *Oculus Enoch et Eliæ, sive Radius Sidereo-mysticus,* the very elaborate engraved title-page of which thus invites us, in the words of the Royal Psalmist, *Venite et videte opera Domini.* In craving permission to doubt his assertion, Sir John Herschel's words may be applied: "Many strange things were seen among the stars before the use of powerful telescopes became common."

629. 4 ♅. I. SEXTANTIS. (h. 685; H. 2041; ℞.) CCCLXXV.

		h.	m.	s.		s.
R. A.		10	8	34	Prec. +	3·12
		°	′			″
Decl.	N	4	0·4		—— S	17·73

This is the second of the two nebulæ spoken of under No. 628. Sir J. Herschel's account of it is that it is "bright; pretty large; very little extended; pretty gradually much brighter in the middle; there is an 11th mag. at an angle of 78·2° and distant 80″."

630. 1415 Σ. URSÆ MAJORIS.

		h.	m.	s.			s.
R. A.		10	9	5	Prec.	+	5·05
Decl.	N	71°	36′·4		——	S	17″·76

	Position.	Distance.	Epoch.
Struve, W.	167°·1	16″·7	1832·21
Main	167·8	16·8	1864·47

A double star. A 6½, very white; B 7½, very white.

631. 3241 h. CHAMÆLEONTIS. (H. 2063.)

		h.	m.	s.			s.
R. A.		10	10	36	Prec.	+	0·50
Decl.	S	80°	19′·1		——	S	17″·81

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864 :—“ ! ; ○ ; p B ; S ; l E ; 13·0^{s} d ; 3 S st nr ;” which means :—“a remarkable object; a planetary nebula; pretty bright; small; little extended; has a diameter of 13^{s} in R. A.; there are 3 small stars near it.”

Engraved, *Cape Obs.*, Pl. vi. Fig. 2.

632. 3239 h. CARINÆ. (H. 2067.)

		h.	m.	s.			s.
R. A.		10	12	49	Prec.	+	2·13
Decl.	S	57°	24′·6		——	S	17″·90

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864 :—“ ! ; v B ; v L ; falcate ; ⁑ N ;” which means :—“a remarkable object; very bright; very large; in shape like a scythe; there is a double star in the nucleus.”

Engraved, *Cape Obs.*, Pl. iv. Fig. 3.

633. 199 ♅. I. URSÆ MAJORIS. (h. 695; H. 2066; 𝕽.)

		h.	m.	s.			s.
R. A.		10	13	5	Prec.	+	3·70
Decl.	N	46°	6′·8		——	S	17″·92

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864 :—“p B ; v L ; m E 45° ± ; v g b M ;” which means :—“pretty bright; very large; much extended in the direction of about 45° with the meridian; very gradually brighter in the middle.”

634. 445 Dunlop CARINÆ. (h. 3238; H. 2068.)

		h. °	m. ′	s.			s. ″
R. A.		10	13	6	Prec.	+	2·45
Decl.	S	45	51·0		——	S	17·91

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“⊕; vL; iR; lCM; gbM; st 13 . . . 16;” which means:—“a globular cluster; very large; of an irregular roundish outline; little compressed in the middle; gradually brighter in the middle; the component stars vary from the 13th to the 16th magnitudes.”

635. γ LEONIS. (Σ. 1424.) CCCLXXVI.

		h. °	m. ′	s.			s. ″
R. A.		10	13	54	Prec.	+	3·30
Decl.	N	20	23·8		——	S	17·82

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	83·5	3·00 ±	1782·71
HERSCHEL, J., and SOUTH	98·4	3·24	1822·24
STRUVE, W.	103·4	2 50	1831·51
SMYTH	107·2	2·8	1843·18
STRUVE, O.	109·0	3·02	1857·28
KNOTT	110·5	3·21	1866·21
DOBERCK	111·1	3·63	1877·23
JEDRZÉJEWICZ	114·2 292·6	3·61 231·46	1880·40

A splendid double star, close to the Lion's mane, about 7½° to the N.N.E. of *a*, and nearly in the middle of the constellation. A 2, bright orange; B 4, greenish yellow, and there are two other stars in the field. This most beautiful object has a slow progressive angular acceleration, with an *annus magnus* of about 407^{y} (Doberck).

[Both the angle and the distance are, it will be seen, slowly increasing.]

This star has been improperly called Algieba, from *Al jeb-bah*, the forehead; for no representation of the Lion which I have examined will justify that position.

636. 266 H. I. URSÆ MAJORIS. (h. 697; H. 2073.)

		h. °	m. ′	s.			s. ″
R. A.		10	14	31	Prec.	+	4·01
Decl.	N	57	28·9		——	S	17·97

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“pB; cL; E; vglbM;” which means:—“pretty bright; considerably large; extended; very gradually less bright in the middle.”

637. 2955 Brisb. CARINÆ. (*h. 4306.)

		h.	m.	s.			s.
R. A.		10	15	11	Prec.	+	1·85
Decl.	S	64°	8′·0		——	S	18″·00

	Position.	Distance.	Epoch.
Herschel, J.	139°·8	1″·4	1836·50
Santiago Obs.	145·5	2·8	1850·28

A close double star. A 7; B 7.

638. T VELORUM.

		h.	m.	s.			s.
R. A.		10	16	49	Prec.	+	2·22
Decl.	S	55°	29′·2		——	S	18″·06

		Position.	Distance.	Epoch.
Herschel, J.	A B	103°·5	7″·0	1836·71
	A C	191·4	6·1	1836·31

A triple star. A 5½; B 10; C 10.

639. 283 H. I. DRACONIS. (H. 2081.)

		h.	m.	s.			s.
R. A.		10	17	2	Prec.	+	5·30
Decl.	N	75°	13′·1		——	S	18″·07

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c L; e R;" which means:—"considerably bright; considerably large; extremely round." D'Arrest failed to find this. (See No. 611, *ante.*)

640. 386 Dunlop CARINÆ. (h. 3245; H. 2090.)

		h.	m.	s.			s.
R. A.		10	17	21	Prec.	+	2·35
Decl.	S	51°	10′·0		——	S	18″·08

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; 9 L & a few S st;" which means:—"a cluster consisting of 9 large and a few small stars."

641. 705 h. LEONIS. (H. 2091; ℜ.)

	h.	m.	s.			s.
R. A.	**10**	**17**	**52**	Prec.	+	3·20
	°	′				″
Decl.	**N**	**13**	**6·6**	——	S	18·10

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; ⁑ or ⁂ in neb.;" which means:—"a remarkable object; a double or triple star in a nebula." Or, as Sir John elsewhere calls it, "a nebulous wisp." The double star is *h. 2529.

642. 58 P. X. URSÆ MAJORIS. (Σ. 1428.) CCCLXXVII.

	h.	m.	s.			s.
R. A.	**10**	**19**	**4**	Prec.	+	3·86
	°	′				″
Decl.	**N**	**53**	**11·0**	——	S	18·17

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	84·5	...	3·84	...	1831·69
Smyth	85·0	...	3·6	...	1832·49
Mädler	86·7	...	3·99	...	1844·21
Dembowski	85·5	...	3·69	...	1858·00
Dunér	88·2	...	3·36	...	1871·32

A neat double star, on the Great Bear's right shoulder. A 8, and B 8½, both white. The juxtaposition seems to be only optical.

To find this pair by alignment, run a line from the Lesser Bear's leading guard, β, through α Ursæ Majoris, and the mid-distance on the N.E. of that lucida will mark the place of κ Draconis, while a similar extent to the S.W. of Dubhe will strike upon 58 P. X.

643. 27 ♅. IV. HYDRÆ. (h. 3248; H. 2102; ℜ.) CCCLXXVIII.

	h.	m.	s.			s.
R. A.	**10**	**19**	**25**	Prec.	+	2·88
	°	′				″
Decl.	**S**	**17**	**35·6**	——	S	18·15

A planetary nebula, pale greyish-white, nearly 2° S. of μ, about 20° S.W. by W. of Regulus, and in the middle of Hydra's body. From its size, equable light, and colour, this fine object resembles Jupiter; and whatever be its nature, must be of awfully enormous magnitude. It was discovered by ♅. in February, 1785, and has four telescopic stellar companions, two of which are posited at nearly equal distances, *np* and *sf*, from the nebula. As a line passing from a star in the *np* quadrant to another in the *sf* just touched its disc, it was diagrammed as above.

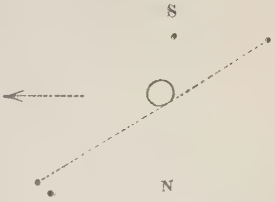

Fig. 16. 27 ♅. IV. Hydræ.

Though this curious nebula escaped H., his remarks on planetary nebulæ are so applicable to it, that they should be here transcribed: "Granting these objects to be equally distant from us with the stars, their real dimensions must be such as would fill, on the lowest computation, the whole orbit of Uranus. It is no less evident that, if they be solid bodies of a solar nature, the intrinsic splendour of their surfaces must be almost infinitely inferior to that of the Sun's. A circular portion of the Sun's disc, subtending an angle of 20″, would give a light equal to 100 *full moons*; while the objects in question are hardly, if at all, discernible to the naked eye. The uniformity of their discs, and their want of apparent central condensation, would certainly augur their light to be merely superficial, and in the nature of a hollow spherical shell; but whether filled with solid or gaseous matter, or altogether empty, it would be a waste of time to conjecture."

[Secchi, in the clear Italian sky with which he was blessed, seems to have seen this nebula to great advantage: according to him, within a circular nebulosity there are 2 clusters connected by 2 semicircular arches of stars, forming a sparkling ring, with one star on the hazy ground of the centre. At Parsonstown something of the same kind has been noted. Huggins finds a gaseous spectrum.]

[Engraved, *Cape Obs.*, Pl. vi. Fig. 5; Lassell, *Mem. R.A.S.*, vol. xxiii. Pl. ii. Fig. 11, and vol. xxxvi. Pl. iii. Fig. 14; Secchi, *Descrizione del Osserv. Coll. Rom.* 1856, Pl. iv. Fig. 5; Rosse, Dublin *Trans.*, 1879, woodcut.]

644. 67 P. X. LEONIS. (Σ. 1431.) CCCLXXIX.

R. A.	**10h 19m 47s**	Prec. +	3s·17
Decl.	**N 9° 20′·2**	—— S	18″·17

	Position.		Distance.		Epoch.
South	64°·0	...	3″·6	...	1825·20
Struve, W.	65·9	...	3·2	...	1832·56
Smyth	65·3	...	3·5	...	1843·16
Smyth	67·5	...	3·5	...	1853·22

A very neat double star, on the Lion's right shoulder; about 5½° to the S.W. of α, and exactly on the line described from that luminary to α Corvi. A 8, white; B 9½, pale blue. This beautiful but delicate object is [perhaps in motion].

[Closely *f* 44 Leonis, an orange star of mag. 6, which itself is 2° *p* ρ Leonis of mag. 4.]

645. 86 H. I. LEONIS MINORIS. (h. 711; H. 2104; R.)

CCCLXXX.

R. A.	10h 21m 6s	Prec. +	3s·39
Decl.	+ 29° 4′·0	—— S	18″·22

A bright-class nebula, beneath the animal, but pretty close to the old Lion's mane; where a N.N.E. ray from α Leonis carried closely before γ¹ Leonis, and extending rather more than as far again, will find it in the centre of a trapezium of 4 stars, of which the 2 southern ones are the largest. This fine object is of an oval shape, with a palpable central nucleus.

646. 72 H. I. LEONIS MINORIS. (h. 714; H. 2112; R.)

R. A.	10h 23m 8s	Prec. +	3s·39
Decl.	S 30° 3′·4	—— S	18″·29

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; E 45° +; p s m b M N;" which means:—"considerably bright; large; extended in the direction of 45° or more with the meridian; pretty suddenly much brighter in the middle, where it exhibits a nucleus." Described at Parsonstown, Jan. 27, 1852, as a "long lenticular ray," but "suddenly brighter in the centre." This last remark however was made on a later date.

647. 94 P. X. SEXTANTIS. (Σ. 1441.)

R. A.	10h 25m 28s	Prec. +	3s·00
Decl.	S 7° 4′·3	—— S	18″·37

	Position.		Distance.		Epoch.
Struve, W.	169°·3	...	2″·59	...	1830·12
Stone, O.	166·3	...	2·46	...	1878·75

A double star. A 7, golden; B 11.

648. s VELORUM.

R. A.	10h 27m 13s	Prec. +	2s·54
Decl.	S 44° 30′·4	—— S	18″·43

	Position.		Distance.		Epoch.
Herschel, J.	37°·8	...	13″·8	...	1836·55

A double star. A 6½; B 6½.

649. 49 LEONIS. (Σ. 1450.) CCCLXXXI.

		h.	m.	s.			s.
R. A.		**10**	**29**	**16**	Prec.	+	3·16
			°	′			″
Decl.	**N**		**9**	**13·1**	——	S	18·50

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	161·1	...	2·39	...	1830·76
Smyth	158·1	...	2·5	...	1838·37
Secchi	157·1	...	2·3	...	1856·74
Gledhill	156·6	...	2·8	...	1874·70
Hall	159·8	...	2·40	...	1878·33

A close double star, under Leo's right shoulder, close to ρ and about 8° W.S.W. of Regulus. A 6, silvery white; B 9, pale blue.

[The above results may imply a very slow retrograde angular motion.]

650. 164 H. I. LEONIS MINORIS. (h. 724; H. 2145; ℞.)

		h.	m.	s.			s.
R. A.		**10**	**29**	**57**	Prec.	+	3·47
			°	′			″
Decl.	**N**		**37**	**53·5**	——	S	18·53

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; m E 135° ±; g l b M;" which means:—"considerably bright; large; much extended in the direction of about 135° with the meridian; gradually less bright in the middle."

651. 60 H. IV. URSÆ MAJORIS. (h. 731; H. 2158; ℞.) CCCLXXXII.

		h.	m.	s.			s.
R. A.		**10**	**31**	**53**	Prec.	+	3·77
			°	′			″
Decl.	**N**		**54**	**5·0**	——	S	18·57

A planetary bluish-white nebula, in the Great Bear's right shoulder, having two stars of the 10th magnitude nearly between it and an orange-coloured companion in the *sf* quadrant. It is a small object but well defined, with a palpable unattenuated round disc; this I note the more particularly as denoting the limit of my means upon such bodies, for I saw no symptom of the "very feeble atmosphere" with which H. says it is surrounded. It bears about 4° S.W. of β Ursæ Majoris, and is nearly on the same parallel with γ.

Sir W. Herschel considered the indistinctness on the edges sufficiently extensive to make this a step between a planetary nebula and those bright in the middle.

[Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 40.]

652. 322 (?) Dunlop CARINÆ. (h. 3286; H. 2167.)

	h.	m.	s.			s.
R. A.	10	33	11	Prec.	+	2·28
		°	′			″
Decl.	S	58	3·1	——	S	18·64

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p b; vv L; i F; ⁑ inv.;" which means:—"pretty bright; unusually large; irregular in figure; there is a double star involved in it." Precedes η Argûs 7^{m} 36^{s}, and is 1° 3′ to the N. thereof.

653. 272 H̥. I. LEONIS. (H. 2170.)

	h.	m.	s.			s.
R. A.	10	33	39	Prec.	+	3·16
		°	′			″
Decl.	N	9	50·5	——	S	18·67

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; i R; mb M B N;" which means:—"bright; small; of an irregularly round outline; much brighter in the middle where it exhibits a bright nucleus." Position given by Schonfeld and Vogel, and perhaps not very exact.

654. 81 H̥. I. LEONIS. (h. 739; H. 2178; R.)

	h.	m.	s.			s.
R. A.	10	37	27	Prec.	+	3·29
		°	′			″
Decl.	N	25	30·3	——	S	18·77

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; gb M; * inv; 2 st f;" which means:—"considerably bright; large; gradually brighter in the middle; a star is involved in the nebula; 2 stars follow it." Seen at Parsonstown as a "very faint spiral with a bright centre."

655. 35 SEXTANTIS. (Σ. 1466.) CCCLXXXIV.

	h.	m.	s.			s.
R. A.	10	37	38	Prec.	+	3·12
		°	′			″
Decl.	N	5	19·6	——	S	18·77

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	240·8	6·7	1825·20
SMYTH	239·6	6·8	1839·19
DUNÉR	240·0	6·6	1872·62
JEDRZEJEWICZ	240·3	6·7	1877·49

A neat double star, on the N. extreme of the graduated limb of the instrument, and three-fifths of the distance between α Hydræ and β Leonis. A 7, topaz yellow; B 8, smalt blue.

656. 95 M. LEONIS. (h. 743; H. 2184; 𝕽.) CCCLXXXV.

	h. m. s.		s.
R. A.	10 38 10	Prec. +	3·18
	° ′		″
Decl.	N 12 16·3	—— S	18·79

A lucid white nebula, on the Lion's ribs, with only two small stars, *np* and *nf*, in the field. Its place is almost due E. of α Leonis, with a distance of 9°, where it forms the southern vertex of a triangle nearly equilateral with γ and δ Leonis. This nebula is round and bright, and perhaps better defined on the southern than on the northern limb, a phenomenon worthy of remark, and observable in the great nebula of Andromeda, and other wonderful masses. It was discovered by Méchain in 1781, and registered by Messier as a "feeble nebula, without a star."

Nearly a degree to the E. of this object follows another round but not equally well-defined nebula, large, and of a pale white colour, 96 M. (= h. 749; H. 2194), also discovered by Méchain in 1781; it constitutes the intersecting point of a rectangle formed by five stars, of which the nearest is in the *sp* quadrant, and of the 11th magnitude.

657. 80 H̥. I DRACONIS. (h. 738; H. 2182; 𝕽.)

	h. m. s.		s.
R. A.	10 38 48	Prec. +	4·65
	° ′		″
Decl.	N 73 25·2	—— S	18·81

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; il E; psb M; *11, 281·8°, 20·0^s;" which means:—"bright; small; irregularly extended; pretty suddenly brighter in the middle; there is an 11th mag. star at an angle of 281·8° and distant 20·0^s in R. A."

658. η ARGUS. (h. 3295; H. 2197.)

	h. m. s.		s.
R. A.	10 40 47	Prec. +	2·31
	° ′		″
Decl.	S 59 6·5	—— S	18·87

"The great nebula in Argo" which surrounds the star η, thus described by Sir J. Herschel in his *Outlines of Astronomy*:—

"This star is situated in the most condensed region of a very extensive nebula or congeries of nebular masses, streaks and branches, a portion of which is represented in Fig. 2. Pl. iv. [of the *Outlines*]. The whole nebula is spread over an area of fully a square degree in extent, of which that included in the figure occupies about one-fourth, that is to say, 28′ in polar distance, and 32′ of arc in R.A., the portion not included being, though fainter, even more capriciously contorted than that here depicted, in which it should be observed that the preceding side is towards the right hand, and the southern uppermost. Viewed with an 18^{in} reflector, no part of this strange object shows any signs of resolution into stars, nor in the brightest and most condensed portion adjacent to the singular oval vacancy in the middle of the figure is there any of that curdled appearance, or that tendency to break up into bright knots with intervening darker portions which characterise the nebula of Orion, and indicate its resolveability. The whole is situated in a very rich and brilliant part of the Milky Way, so thickly strewed with stars (omitted in the figure), that in the area occupied by the nebula, not less than 1200 have been actually counted, and their places in R.A. and P.D. determined. Yet it is obvious that these have no connection whatever with the nebula, being, in fact, only a simple continuation over it of the general ground of the galaxy, which on an average of 2 hours in Right Ascension in this period of its course contains no less than 3138 stars to the square degree, all, however, distinct, and (except where the object in question is situated) seen projected on a perfectly dark heaven, without any appearance of intermixed nebulosity. The conclusion can hardly be avoided, that in looking at it we see through, and beyond the Milky Way, far out into space, through a starless region, disconnecting it altogether from our system. 'It is not easy for language to convey a full impression of the beauty and sublimity of the spectacle which this nebula offers, as it enters the field of view of a telescope fixed in Right Ascension, by the diurnal motion, ushered in as it is by so glorious and innumerable a procession of stars, to which it forms a sort of climax,' and in a part of the heavens otherwise full of interest. One other bright and very remarkably formed nebula of considerable magnitude precedes it nearly on the same parallel, but without any traceable connection between them."

The nebula alluded to at the close of the foregoing paragraph appears to be H. 2167, which precedes η Argûs 7^{m} 34^{s}, and 1° 3′ to the N., and which has already been described. (See No. 652, *ante.*)

A keen controversy sprang up some years ago as to whether any sufficient proofs existed of this great nebula having undergone changes of figure within the previous ½ century. The balance of testimony was against the idea. For particulars of the arguments adduced I must refer the reader to my *Handbook of Astronomy*, 3rd edition, p. 546.

Engravings of this nebula will be found in the *Cape Obs.*, Pl. ix. Fig. 1; in Sir J. Herschel's *Outlines of Astronomy*, as mentioned above; *Month. Not. R.A.S.* vol. xxiv. p. 2, (Abbott); vol. xxviii. p. 200, (Abbott); vol. xxix. p. 82, (Capt. J. Herschel); vol. xxxi. p. 234, (Abbott.)

659. 17 H. I. LEONIS. (h. 757; H. 2203; R.)

	h. m. s.		s.
R. A.	10 42 1	Prec. +	3·18
Decl.	N 13° 9′·4	—— S	18″·90

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864 :—"v B; c L; R; psb M; r;" which means :—"very bright; considerably large; round; pretty suddenly brighter in the middle; resolveable."

660. 1474 Σ. HYDRÆ.

	h. m. s.		s.
R. A.	10 42 12	Prec. +	2·95
Decl.	S 14° 40′·9	—— S	18″·91

		Position.		Distance.		Epoch.
Struve, W.	A B	22°·2	...	71″·6	...	1822·16
	C B	193·9	...	6·9		
Stone, O.	C B	196·4	...	6·6	...	1878·23

A triple star. A 7½, very white; B 9, very white; C 8½. 1½° N. of *ν* Crateris, *alias ν* Hydræ.

661. 159 P. X. HYDRÆ. (Σ. 1473.) CCCLXXXVI.

	h. m. s.		s.
R. A.	10 42 13	Prec. +	2·95
Decl.	S 15° 2′·7	—— S	18″·91

	Position.		Distance.		Epoch.
Struve, W.	9°·7	...	31″·4	...	1822·16
Smyth	10·0	...	31·5	...	1836·22
Main	9·3	...	31·9	...	1863·19

A double star, near the cup on the Hydra's back, where an E.S.E. ray from *α* Hydræ towards the middle of the little square that constitutes Corvus will meet it in the half-way. A 8, pale white; B 9, light blue.

662. 18 H I. LEONIS. (h. 758; H. 2207; R.) CCCLXXXVII.

	h. m. s.		s.
R. A.	10 42 28	Prec. +	3·18
Decl.	N 13° 12′·3	—— S	18″·92

A pair of bright-class nebulæ, *sp* and *nf* of each other, on the Lion's body; while at a small distance to the *nf* is a neat but minute double star. These are two of the three nebulæ described by both the Herschels; but the third I cannot distinguish, unless it be a glow in the *sf*, in a vertical line with two small stars:

We now approach a region where these mysterious luminous masses are scattered over the vast concavity of the heavens, in truly boundless profusion.

The objects here treated of are among the nebulæ included within a round patch of about 2° or 3° in diameter, in the apparently starless space of the Lion's loins. The field *may* be found, under a moderate power, S. of the line which joins α and θ Leonis about 10° E. of, and nearly on the parallel with, the former.

["The 3rd nebula forms nearly an equilateral triangle with the other 2: Query, variable."—*Brodie.*]

663. 116 H. I. LEONIS MINORIS. (h. 765; H. 2216; R.)

		h.	m.	s.			s.
R. A.		10	43	42	Prec.	+	3·36
		°	′				″
Decl.	N	33	33·9		——	S	18·95

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"cB; pS; iI E; 1st of 2;" which means:—"considerably bright; pretty small; irregularly extended; the 1st of 2 nebulæ." The other nebula here mentioned (=117 H. I.; h. 766; H. 2217) is situated at an angle of 20° in the *nf* quadrant at a distance of 80″, and is the fainter of the 2.

Both are engraved in Lord Rosse's paper in *Phil. Trans.*, 1861, Pl. xxvii. Fig. 15.

664. 41 SEXTANTIS. CCCLXXXVIII.

		h.	m.	s.			s.
R. A.		10	44	47	Prec.	+	3·01
		°	′				″
Decl.	S	8	18·9		——	S	18·99

		Position.		Distance.		Epoch.
		°		″		
Burnham	A B	303·8	...	26·9	...	1879·34
	A C	72·3	...	233·4		

A most delicate triple star below the Sextant, of which the third is not seen by me, though I have measured a distant companion in the same quadrant. A 6, white; B 16, dusky; C 10, bluish. It lies exactly on the parallel, and 20° to the E., of α Hydræ, nearly "alone in its glory," so that, like an oasis in a desert, it is tolerably visible to the inquiring eye. A line from ε, in the Lion's head, through α Leonis prolonged more than as far again to the S.E., strikes upon it. This object was forwarded to me by Sir J. Herschel, as an *experimentum crucis* of my optical power, on mounting the large telescope, there being a minute point in the *sf* of the 17th or 18th magnitude, which baffled all my endeavours to detect it. Indeed the one in the *np* quadrant, B, is only caught by transient glimpses and keen gazing, so that the estimated angle and distance are mere guesses.

665. 27 ♅. I. LEONIS. (h. 774; H. 2229; 𝕽.)

		h.	m.	s.			s.
R. A.		**10**	**45**	**5**	Prec.	+	3·18
		°	′				″
Decl.	**N**	**13**	**59·7**		——	S	18·99

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; l E 135° ±; smb MN;" which means:—"bright; small; little extended in the direction of about 135° with the meridian; suddenly much brighter in the middle where it exhibits a nucleus."

666. 362 ♅. II. LEONIS MINORIS. (h. 773; H. 2227; 𝕽.) CCCLXXXIX.

		h.	m.	s.			s.
R. A.		**10**	**45**	**12**	Prec.	+	3·31
		°	′				″
Decl.	**N**	**28**	**33·4**		——	S	19·00

A faint round nebula, pale white, on the ham of the Little Lion's hind-leg; it is preceded nearly on the parallel by an 8th magnitude star, and there are several other small ones in the field, of which four following ones cross the parallel in a neat arc. It may be fished for nearly in mid-distance between γ Leonis and ξ Ursæ Majoris.

667. 172 ♅. I. LEONIS MINORIS. (h. 780; H. 2238; 𝕽.)

		h.	m.	s.			s.
R. A.		**10**	**46**	**16**	Prec.	+	3·39
		°	′				″
Decl.	**N**	**37**	**12·0**		——	S	19·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"p B; p L; vm E 42·5°; $\overset{*}{*}$ inv?;" which means:—"pretty bright; pretty large; very much extended in the direction of 42·5° with the meridian; a double star is seemingly involved in the nebula." Engraved, *Cape Obs.*, Pl. iv. Fig. 10.

668. 179 P. X. LEONIS. (Σ. 1482.) CCCXC.

	h.	m.	s.		
R. A.	10	46	26	Prec. +	3·13 s.
		°	′		″
Decl. N		8	2·8	—— S	19·03

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	305·3	11·7	1831·97
SMYTH	305·6	11·8	1836·26

A neat double star, under Leo's body. A 8½, and B 9, both bluish white. It is to be picked up about 13° on a line from *α* Leonis to *α* Virginis.

669. 267 H̥. I. URSÆ MAJORIS. (h. 787; H. 2245; R.)

	h.	m.	s.		
R. A.	10	47	50	Prec. +	3·73 s.
		°	′		″
Decl. N		57	34·2	—— S	19·07

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; i R; vglb M; * 10 *nf* 2′;" which means:—"considerably bright; pretty large; of an irregular round outline; very gradually less bright in the middle; there is a star of mag. 10 is the *nf* quadrant at a distance of 2′." Precedes *β* Ursæ Majoris 7^{m} 22^{s}; and is 35′ to the N. of it. Engraved, Rosse, *Dublin Trans.*, 1879, Pl. iii. Fig. 2245.

670. 268 H̥. I. URSÆ MAJORIS. (H. 2257.)

	h.	m.	s.		
R. A.	10	49	15	Prec. +	3·72 s.
		°	′		″
Decl. N		57	42·4	—— S	19·11

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v S; R; stellar;" which means:—"very bright; very small; round; stellar."

Precedes *β* Ursæ Majoris 5^{m} 57^{s}; and is 44′ to the N. of it.

671. 54 LEONIS. (Σ. 1487.) CCCXCI.

	h. m. s.		s.
R. A.	10 49 39	Prec. +	3·27
Decl.	N 25° 20′·2	—— S	19″·12

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	99·2	...	7·1	...	1781·14
STRUVE, W.	102·8	...	6·1	...	1830·35
SMYTH	102·7	...	6·2	...	1839·33
SECCHI	104·3	...	6·3	...	1856·59
DOBERCK	104·9	...	6·5	...	1877·30
JEDRZEJEWICZ	106·3	...	6·3	...	1878·35

A neat double star just over the Lion's back, where it is preserved from the Lesser Lion by one of the map-maker's nooks; it will be found about 15° N.E. of *α* Leonis, on the line produced towards *η* Ursæ Majoris, at the end of the Great Bear's tail. A 4½, white; B 7, grey. This is a beautiful object.

[A slow increase in angle seems certain.]

672. 4531 Lac. CARINÆ. (*h. 4383.)

	h. m. s.		s.
R. A.	10 50 6	Prec. +	1·95
Decl.	S 70° 7′·9	—— S	19″·12

	Position.		Distance.		Epoch.
HERSCHEL, J.	285°·8	...	1″·42	...	1837·18

A double star. A 7; B 8½.

673. 1495 Σ. URSÆ MAJORIS.

	h. m. s.		s.
R. A.	10 53 5	Prec. +	3·77
Decl.	N 59° 29′·9	—— S	19″·21

	Position.		Distance.		Epoch.
STRUVE, W.	38°·2	...	34″·4	...	1833·07

A double star. A 6¼, yellowish; B 9, white. About midway between *α* and *β*.

674. 87 H. I. LEONIS MINORIS. (h. 805; H. 2274; R.) CCCXCII.

	h. m. s.		s.
R. A.	10 54 12	Prec. +	3·29
	° ′		″
Decl.	N 29 34·0	—— S	19·24

A large bright-class orbicular nebula, on the Little Lion's haunch, lying 4° on a line from ξ Ursæ Majoris into the S.W. space towards α Leonis. This remarkable object, with the exception of a 7th magnitude star in the N., is in a field strewed with glimpse stars, from the most remote of which it may still be inconceivably remote, proceeding by analogy. H. observed it closely, and says, "no doubt a distant globular cluster;" in other words, not only suns beyond suns, but glorious systems of suns arranged in harmonious order. Where facts are still wanting, we can only form our opinions upon general principles. Now, when the dot which includes our system occupies a range of 3,600,000,000 of miles in diameter, besides a larger space which it controls,—should it be taken for an average among the millions of suns around, what imagination can grasp the immensity of creation! Indeed, where system thus stretches beyond system, the space must be infinite, or infinitely near it; and in such contemplation we become conscious of our own littleness. But no subject whatever, except Revelation, can give a more exalted conception of the Eternal Fountain of all Intelligence.

675. α CRATERIS. CCCXCIII.

	h. m. s.		s.
R. A.	10 54 27	Prec. +	2·95
	° ′		″
Decl.	S 17 42·9	—— S	19·24

		Position.	Difference of R. A.	Epoch.
		°	s.	
SMYTH	A B	97	42·1	1835·38
	B C	268	4·9	

A star with two very distant companions in the *sf*, on the base of the Cup. A 4, orange tint; B 8, intense blood colour; C 9, pale blue,—a fourth star away in the *sf* quadrant. This object may once have been brighter, since it acquired a name—Alkes—and was lettered α; but δ is now the lucida, and wears the *Nautical Almanac* honours. It may be found by carrying an occult line from Arcturus, though δ Virginis, and rather more than the same distance to the S.W. The large star has a very considerable proper motion.

[B is the well-known variable R Crateris. See No. 677, *post.*]

Κράτηρ, Crater, though a small and inconsiderable asterism, is one of the old 48; and is easily made out by 6 stars of the 4th magnitude in an annular form, on Hydra's back, forming Cicero's *fulgens Cratera.* The scholiast on Germanicus termed it *Urna*, and the Arabians *Báṭiyah*, a large cup, and *al-Khas*, the shallow basin; which last was corrupted to *Alhas* by the framers of the Alphonsine Tables, but Scaliger properly suggested that the word should be *Alkes*, the name now used for the star α. The number of its constituents have been thus stated:—

Ptolemy	7 stars.	Hevelius	10 stars.
Tycho Brahé . .	8 ,,	Flamsteed . . .	31 ,,
Bayer	11 ,,	Bode	95 ,,

676. 101 H. II. LEONIS. (h. 806; H. 2276; 𝕽.)

	h. m. s.		s.
R. A.	**10 54 31**	Prec. +	3·17
	° ′		″
Decl.	**N 14 29·4**	—— S	19·24

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; l E 80°±; smb MN;" which means:—"very bright; pretty large; a little extended in the direction of about 80° with the meridian; suddenly much brighter in the middle where it exhibits a nucleus."

677. R. CRATERIS.

	h. m. s.		s.
R. A.	**10 55 8**	Prec. +	2·94
	° ′		″
Decl.	**S 17 37·6**	—— S	19·26

A fine red star, variable, from about the 8th to the 9th magnitude. Sir J. Herschel, "scarlet;" Webb, 1874, "very intense ruby," 9½; Birmingham, 1876, "red, not so deep as formerly." Later on in 1876 Birmingham marked it "good red," and "crimson." On March 6, 1880, its colour was to me by no means striking.

678. β URSÆ MAJORIS. CCCXCIV.

	h. m. s.		s.
R. A.	**10 55 12**	Prec. +	3·65
	° ′		″
Decl.	**N 56 58·3**	—— S	19·26

	Position.	Distance.	Epoch.
	°	″	
Burnham	353·9 ...	245± ...	1879·29

A bright star with a distant companion, on the Greater Bear's body. A 2, greenish white; B 11, pale grey,—other stars in view.

Although the name Helice, a winding spiral figure in geometry, pertained to the whole asterism of the Greater Bear—as will presently be seen—it was also specially applied to β, the southernmost of the two pointers; this star has always been a favourite with ancient and modern seamen, because, by a line from it through α—both stars being the farthest from the tail—the Pole-star is always readily found. It has since then obtained the name of Merak, from the Arabian *Meráḳ al-dubb-al-akbar*, the loins of the Greater Bear:

> Where Charles's Wain adorns the sky, if Merak you would know,
> The Pole-star led through Dubhe's light will mark it just below.

679. α URSÆ MAJORIS. CCCXCV.

R. A.	**10h 56m 56s**	Prec.	+ 3s·77
Decl.	**N 62° 20′·7**	——	S 19″·30

	Position.	Distance.	Epoch.
SMYTH	203°·8	380″·6	1832·41

A *Nautical Almanac* star, with a distant companion, on the Great Bear's back. A 1½, yellow; B 8, yellow. A, the northern pointer, which was marked β or 2nd magnitude by Ptolemy, was suspected by H. of being variable, and he asked me in October, 1838, to compare it with ε in the same asterism; but my slight examination was *res infecta*.

[It was Lalande who suggested the variability of this star, but the question has made no progress since Smyth wrote his remarks above. B violet in 1850 according to Webb.]

Ἄρκτος μεγάλη, Arctos Major, the Great Bear, rivals Orion in beauty, and is the most splendid and conspicuous of those asterisms in the Northern Hemisphere which never set; and is, of course, one of the ancient constellated groups. But the "doers into English" have certainly injured the purity of its descent to our times, for Job is made to talk about Arcturus, whereas Bochart assures us that the Hebrew word is derived from an Arabic one for bier; but Eben Ezra maintains it to be *agalah*, a waggon. Both these renderings apply to the succeeding denominations of the Greeks, Romans, Italians, Germans, and English, in the Ἅμαξα, Plaustrum, Triones, Feretrum, Cataletto, Wagen, and David's Car, the Plough, and Charles's Wain. In the latter, the two pointers are termed the hind wheels, the other two the fore wheels, and the three in the tail are the horses. The Egyptians, we are assured, called this constellation the Hippopotamus, whence my friend, Professor Leemans, says, "Ursa Major, quæ secundum Champollionem dicebatur

Canis Typhonis, in tabulis astronomicis indicatur figurâ hippopotami: Horus Apollo." It was also sometimes styled ʽΕλίκη in Greece, a name which, dropping the mythological fable, alludes to its circumvolution round the pole, whence Aratus, speaking through Germanicus, says:

> Dat Graiis *Helice* cursus majoribus astris,
> Phœnicas Cynosura regit.

Homer's description, however, of this revolving course, by which the asterism watches Orion from its arctic den, is but lamely rendered by Pope. In those early times the name of bier, or sarcophagus, was directly applied to the four bright stars disposed in the form of a quadrangle on the bear's body; and the three which we call the horses, or tail—for this bear actually has a tail of 20° projecting from his stern-frame—symbolized the children of the deceased in attendance. Our popular name of Charles's Wain (*ceorl* unde *churl*) is familiarized from the Gothic Karlwagen, the *charl*, or peasant's cart; and it is applied to the seven well-known stars α, β, γ, δ, ϵ, ζ, and η, which are disposed in the form of a quadrangle joined by one of its corners to a triangle. Here the classic astronomer will recognise the Septentriones, of which Cicero says:

> Quas nostri Septem soliti vocitare triones.

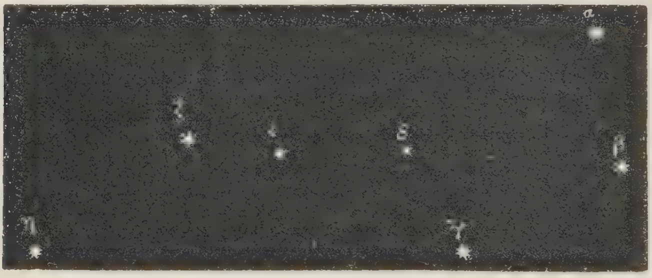

FIG. 17. URSA MAJOR.

This constellation guided the nocturnal path of ships, whence it is introduced into the beautiful picture of night in Apollonius Rhodius; and Manilius tells us,—

> Seven equal stars adorn the Greater Bear,
> And teach the Grecian sailors how to *steer.*

Modern navigators, of course, resorted to the same asterism, wherefore King James in his *Prentise*, describing the azure gown of Urania as decorated with fixed stars, says,—

> Heir shynes the Charlewain, there the Harp gives light,
> And heir the Seaman's Starres, and there Twinnis bright.

Nor is it less an object of regard with our present seamen, by whom it is usually referred to in alignment, as a known figure; though as Neptune obligingly consented that it should never set within his domain, both he and Juno must have been dwelling in Europe, for it has been my fate to see it set often enough, as well as to lose it entirely. And there is little in southern celestial scenery to balance the loss, either in beauty or utility. Look to the rhymes for its prime use in alignment:

> Where yonder radiant hosts adorn the northern evening sky,
> Seven stars, a splendid glorious train, first fix the wand'ring eye.
> To deck great Ursa's shaggy form, those brilliant orbs combine;
> And where the first and second point, there see Polaris shine.

But it must be admitted, that our poets have done little to foster or exalt the taste for astronomy, though Young's—

> *One* sun by day, by night *ten thousand* shine;
> And light us deep into the Deity—

deserves a word of thankful commendation.

To return. The principal star in this constellation is called Dubhe, from *Dubb*, the Arabic for a bear, the name of the whole asterism, and erroneously entered in the Alphonsine Tables for α Ursæ Majoris only. It was also designated *Ḍhuhr dubb-al-akbar*, the back of the Great Bear. When Bayer facilitated the arrangement of the fixed stars, in 1603, he marked those in each constellation by the Greek alphabet, according to their degrees of brightness. But he made an exception in Ursa Major, so that the principal stars are lettered nearly in their order of R.A. The constituents of this grand asterism have been thus numbered, as progressive power has been applied:—

Ptolemy . . .	35 stars.	Griemberger . .	57 stars.
Copernicus . .	35 „	Hevelius	73 „
Tycho Brahé . .	56 „	Flamsteed . . .	87 „
Kepler	56 „	Bode	338 „

680. 88 𝕳. I. LEONIS MINORIS. (h. 810; H. 2287; 𝕽.)
CCCXCVI.

R. A.	10h 57m 12s	Prec. + 3s·27
Decl.	N 28° 33′·9	—— S 19″·31

A bright-class nebula, on the Little Lion's haunch, with some glimpse stars in the field, of which the principal are in the *sp* quadrant. It is pale white, elongated, and has the semblance of a nucleus. H. says it is a resolveable distant cluster.

681. 229 P. X. LEONIS. (Σ. 1504.) CCCXCVII.

R. A.	10h 58m 19s	Prec. +	3s·10
Decl.	N 4° 13′·9	—— S	19″·33

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	275·6	...	1·07	...	1829·13
SMYTH	280·0	...	1·3	...	1836·29
STRUVE, O.	278·1	...	1·07	...	1854·99
SPÖRER	286·3	...	1·16	...	1875·37
HALL, A.	284·0	...	1·13	...	1878·33

A very neat double star, preceding the Lion's hind legs. A 8, and B 8, both white. It closely follows 58 Leonis, a star of the 5th magnitude, which lies a little S. of a line produced from *α* Leonis to *α* Virginis, at one-third of the distance. Σ. marked it one of his "pervicinæ."

[According to O. Struve, one or both of the components are variable.]

682. 13 H. I. LEONIS. (h. 818; H. 2301; R.) CCCXCVIII.

R. A.	11h 0m 10s	Prec. +	3s·07
Decl.	N 0° 33′·5	—— S	19″·31

A bright-class nebula, preceding the Lion's hind-paws, with an 8th magnitude star following in the *sf* quadrant, and four of the 10th magnitude form a trapezium in the *nf*, between which and the nebula is one of the 13th. The nebula is large, elongated in direction *np* and *sf*, pale white, and well defined, with the brilliance increasing in the *sp* region. It closely follows 62 Leonis, a star of the 6th magnitude, which is 20° S.E. of *α*, and about 11½° W. by S. of *β* Virginis, the nearest bright star to the E.

This enormous mass of luminous matter is an outlier of the vast nebulous tract which appears to be posited nearly at right angles to the Galaxy; but in irregular occurrence. This wonderful zone consists mostly of groups of spherical nebulæ; and doubtless they are as much beyond our sidereal system, as the distance of the stars exceeds that of our planet from the Sun! As to our own apparently vast distance from the solar orb, it may be deemed pitifully minute and almost infinitesimal in comparison.

Besides the more condensed masses, diffused nebulosity exists in an abundance which exceeds all imagination; and the indefatigable H. examined more than 150 square degrees of it. His conclusion is, that the high degree of rarefaction of the nebulous matter should not be considered an obstacle to the theory of its finally being compressed into a body of the density of our Sun: for, supposing the nebula to be about 320 billions of miles distant, and its diameter subtending an angle of 10′, then must its magnitude exceed that of the Sun by more than 2 trillions of times! This presents magnitude and mass vast and inconceivable; and has staggered many a tyro. Now several important astronomical truths have been strongly conceived, and adopted by vigorous understandings, long before their evidence became indubitable. The developments which crown H. with imperishable fame, will for ages draw forth both practical and theoretical talent, so that his reasonings and conclusions on the condensation of nebulous matter into suns and planets will be rigorously reviewed and tested.

683. 239 P. X. LEONIS. (Σ. 1507.) CCCXCIX.

	h.	m.	s.			s.
R. A.	**11**	**0**	**25**	Prec.	+	3·12
		°	′			″
Decl.	**N**	**7**	**43·8**	——	S	19·38

	Position.	Distance.	Epoch.
	°	″	
South	164·0	8·6	1825·29
Smyth	164·7	8·2	1839·16

A neat and delicate double star, close to the Lion's hind-legs. A 8, topaz yellow; B 11½, cerulean blue. These places do not quite quadrate with Piazzi's; and there is some doubt as to identity, this being placed before No. 238, Hora X., in the Palermo Catalogue. Its relative fixity seems conclusively established.

This small pair closely follows χ Leonis, a 4th mag., nearly in mid-distance between α Leonis and η Virginis: it will, therefore, be readily caught up. [But a somewhat larger star more to the N. is nearer χ than this double.]

684. 323 Dunlop CENTAURI. (h. 3315; H. 2308.)

	h.	m.	s.			s.
R. A.	**11**	**1**	**50**	Prec.	+	2·53
		°	′			″
Decl.	**S**	**58**	**4·7**	——	S	19·41

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!; Cl; e L; R; l C; st 8 . . . 12;" which means:—"a very remarkable cluster; extremely large; round; little compressed; the component stars vary from the 8th to the 12th magnitudes."

685. 248 P. X. CENTAURI. (*h. 4409.)

		h. / °	m. / ′	s.		s. / ″
R. A.		11	2	10	Prec. +	2·76
Decl.	S	42	2·3		—— S	19·42

	Position.		Distance.		Epoch.
HERSCHEL, J.	278°·0	...	1″·40	...	1837·27

A double star. A $5\frac{1}{2}$; B 9.

686. 220 H. I. URSÆ MAJORIS. (H. 2317; R.)

		h. / °	m. / ′	s.		s. / ″
R. A.		11	4	30	Prec. +	3·52
Decl.	N	53	58·5		—— S	19·47

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c L; c E 160°;" which means:—"considerably bright; considerably large; considerably extended in the direction of 160° with the meridian."

687. 351 H. III. LEONIS MINORIS. (h. 829; H. 2319; R.)

		h. / °	m. / ′	s.		s. / ″
R. A.		11	4	45	Prec. +	3·25
Decl.	N	29	21·4		—— S	19·46

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; F (? var.); S; R; b M; * 9 f 1′; 1st of 4;" which means:—"a remarkable object; faint and perhaps variable; small; round; brighter in the middle; a star of mag. 9 follows at a distance of 1′; the 1st of 4 nebulæ." No. 2 of the series follows at 6s and is exceedingly faint and small; No. 3 follows at 8s and is very faint and rather small; No. 4 follows at 32s and is very faint but larger than the others. These nebulæ are respectively H. 2320; 2321; and 2326. All are S. of H. 2319, within about 6′ of arc. These objects lie near the boundary line between Leo Minor and Ursa Major. "The observations of this nebula [H. 2319], which are numerous, disagree so very remarkably in the particular of brightness, that a considerable suspicion of variability exists."—*Sir J. Herschel.*

688. 46 H. V. URSÆ MAJORIS. (h. 831; H. 2318; R.) CCCC.

		h. / °	m. / ′	s.		s. / ″
R. A.		11	4	59	Prec. +	3·55
Decl.	N	56	15·6		—— S	19·48

A large milky-white nebula, on the body of the Great Bear, with a small star at its *sp* apex, and an 8th magnitude preceding it at double the distance; there is also a brightish group in the *np* quadrant. It is easily found, since it lies only about 1° S.E. of β. This object is faint but well defined, being much elongated with an axis-major trending *sp* and *nf* across the parallel, and a small star, like a nucleus, in the centre. As H. considers this star to be unconnected with the nebula, it follows that it is between us and it, and therefore strengthens to confirmation our belief in the inconceivable remoteness of those mysterious bodies.

689. 9 P. XI. LEONIS. (Σ. 1517.) CCCCI.

		h.	m.	s.			s.
R. A.		11	7	56	Prec.	+	3·19
		°	′				″
Decl.	N	20	44·0		——	S	19·54

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	287·8	1·05	1829·70
Smyth	288·6	1·2	1833·51
Secchi	287·4	0·78	1856·98
Doberck	284·8	0·61	1877·26
Burnham	281·1	0·83	1879·22

A neat double star, on the Lion's loins; and closely *sp* δ, a star of the 3rd magnitude. Both 7½, and both faint yellow. This is a beautiful object, resembling η Coronæ.

[According to the observations of the two Struves and Secchi one or other of these stars is certainly variable. Perhaps both the angle and the distance are decreasing. "Common proper motion; and undoubtedly a binary system."—*Burnham.*]

690. 1516 Σ. DRACONIS.

		h.	m.	s.			s.
R. A.		11	8	7	Prec.	+	4·23
		°	′				″
Decl.	N	74	4·5		——	S	19·55

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	A B 298·7	9·9	1831·54
Struve, O.	A B 310·6	6·1	1841·92
Struve, O.	A B 341·7	2·9	1850·92
Struve, O.	A B 64·4	3·7	1861·33
	A C 297·0	8·0	
Dunér	A B 87·3	7·3	1871·49
	A C 299·4	7·4	1875·54
Flammarion	A B 91·0	9·5	1877·37

A triple star. A 7½, yellowish; B 8, ashy yellow; C 11. O. Struve discovered C in 1858. "The star B is therefore fixed, and has no physical relation with A. The star C, on the contrary, participates in the large proper motion of A."—*Gledhill.*

691. δ LEONIS. CCCCIII.

	h.	m.	s.			
R. A.	11	8	15	Prec.	+	3·19 s.
		°	′			
Decl.	N	21	7·6	——	S	19″·54

		Position.	Difference of R. A.	Epoch.
		°	s.	
Smyth	A B	50	4·9	1836·21
	A C	345	2·9	
		Position.	Distance.	
		°	″	
Burnham	A B	44·2	95·5	1879·28
	A C	344·7	*not stated*	

A *Nautical Almanac* star, with companions forming a coarse triple object, in a black field, at the root of the Lion' tail. A 3, pale yellow; B 13, blue; C 9, violet; a fourth and most minute star is suspected nearly in the line of C, and about a third of the distance, but this was not confirmed by Dawes, who also examined the object for me.

δ Leonis and 6 Virginis are the stars which Flamsteed observed, in 1690, with the object which has since proved to be Uranus.

This star is called *Zosma*, from *ζῶσμα* or *ζῶμα*, a tunic or girdle, but why so designated, deponent sayeth not: it is not mentioned by Ideler. Zosma will be readily distinguished 18° N.E. of *α* Leonis, and 5° due N. of *θ*, where it forms a fine scalene triangle with *θ* and *β*.

692. 97 M. URSÆ MAJORIS. (h. 838; H. 2343; ℞.) CCCCII.

	h.	m.	s.			
R. A.	11	8	19	Prec.	+	3·51 s.
		°	′			
Decl.	N	55	36·7	——	S	19″·55

A large planetary nebula, or globular collection of nebulous matter, found by M. in 1781 on the Great Bear's flank, with several stars in

Fig. 18. 97 M. Ursæ Majoris.

the field, one of which is pretty close. It lies about 2° to the S.E. of β, and just S. of an imaginary line from β to γ. This very singular object is circular and uniform, and after a long inspection looks like a condensed mass of attenuated light, seemingly of the size of Jupiter. This diagram was sketched. Sir W. Herschel discovered this orb in 1789, and found it a globular body of equal light throughout: he also says, "From the observation of the 20ft telescope, it appears that the profundity of this object is beyond the guaging power of that instrument; and as it must be sufficiently distant to be ambiguous, it cannot well be less than of the 980th order." The 980th order! [Sir J. Herschel assigned to this object a diameter of 2′ 40″; the light equable, with only a softened edge; but the Earl of Rosse found a good deal of structure in it, that is to say, 2 large perforations and a resolveable spiral arrangement. Webb points out that of 2 stars, one in each opening, one only has been seen since 1850. Huggins finds the spectrum to be gaseous.]

693. 29 H. I. LEONIS. (h. 840; H. 2347; R.)

		h.	m.	s.			s.
R. A.		11	8	50	Prec.	+	3·14
			°	′			″
Decl.	N		13	24·8	——	S	19·56

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; c L; E 90° ±; psmb M;" which means:—"bright; considerably large; extended in the direction of about 90° with the meridian; pretty suddenly much brighter in the middle." Engraved, Vogel, *Nebelflecken*, 1876, Pl. i. Fig. 2.

694. 234 B. URSÆ MAJORIS. (Σ. 1520.)

		h.	m.	s.			s.
R. A.		11	9	43	Prec.	+	3·49
			°	′			″
Decl.	N		53	22·5	——	S	19·58

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	345·3	...	13·0	...	1831·71
Main	344·0	...	13·1	...	1864·46

A double star. A 7, white; B 8½, bluish.

695. 50 H̥. II. LEONIS. (h. 845; H. 2358; ℞.) CCCCIV.

		h.	m.	s.			s.
R. A.		11	11	6	Prec.	+	3·17
Decl.	N	18°	38′·7		——	S	19″·60

A fine round white nebula, at the root of the Lion's tail, well-defined, and with a brightish centre. A little to the N. of it is another rather smaller, which is 51 H̥. II. [H. 2359]; and there are some telescopic stars between them. They are followed by a triangle of three stars. and the whole forms a field of high interest.

This object was described by H̥. as a "triple" nebula, but I can only see the above-mentioned. It bears about 2½° to the S.S.E. of δ Leonis.

696. 270 H̥. I. URSÆ MAJORIS. (h. 847; H. 2360; ℞.)

		h.	m.	s.			s.
R. A.		11	11	57	Prec.	+	3·55
Decl.	N	59°	22′·7		——	S	19″·60

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p S; l E 90°±; vsvmb MSN;" which means:—"very bright; pretty small; a little extended in the direction of about 90° with the meridian; very suddenly very much brighter in the middle where it exhibits a small nucleus."

697. 271 H̥. I. URSÆ MAJORIS. (h. 848; H. 2362; ℞.)

		h.	m.	s.			s.
R. A.		11	12	6	Prec.	+	3·53
Decl.	N	58°	35′·5		——	S	19″·62

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; c L; m E 305·0°; smb MN;" which means:—"very bright; considerably large; much extended in the direction of 305·0° with the meridian; suddenly much brighter in the middle where it exhibits a nucleus."

698. ξ URSÆ MAJORIS. (Σ. 1523.) CCCCVI.

		h.	m.	s.			s.
R. A.		11	12	20	Prec.	+	3·25
Decl.	N	32°	9′·5		——	S	19″·62

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	143·8	...	3·50	...	1780·33
Herschel, J., and South	258·5	...	2·81	...	1823·29
Smyth	207·5	...	1·8	...	1830·94
Kaiser	152·2	...	2·08	...	1840·25
Struve, O.	124·1	...	2·67	...	1850·39
Morton	105·3	...	2·84	...	1860·08
Dunér	53·8	...	1·16	...	1870·43
Wilson and Seabroke	295·0	...	1·50	...	1877·41
Jedrzejewicz	272·0	...	1·81	...	1880·48

A binary star of the most interesting description, in the Bear's left hind-paw, directly under ν, or *Al úlạ Borealis;* the two forming a miniature of δ and θ Leonis, which are 10° due S. of them. A 4, subdued white; B $5\frac{1}{2}$, greyish white, and both very bright. It is usually designated Al Ula Australis, from the Arabian *Al-ḳafzah-al-ūlạ*, the gazelle's first spring or leap.

This extraordinary pair forms an object of the gravest importance, since its motion is so rapid as to admit of being demonstrated by measurements at short intervals. So far back as 1825, H. most strongly recommended it for *constant* and careful observation. "This done," said he, "there is no doubt of our arriving at a precise knowledge of the elements and position of the orbit described by each about their common centre of gravity; and the question of the extension or non-extension of the Newtonian law of gravity to the sidereal heavens—the next great step which physical astronomy has yet to make—will be effectually decided." The effect of such a call was to animate exertion; and its consequence has been a series of excellent measures by various astronomers.

There is not a binary star which goes further to prove that there is yet much to be accomplished in the art of measuring, than ξ; for the discordances in the value of its annual movement in orbit are great. This, and the gap in the period of the starting points, make it difficult to investigate the elements by the process of gathering the radii vectores of the revolver from the angle of position—a method founded by Herschel on the condition, that they are equal to the square roots of the apparent angular velocities. Still I essayed it, and brought out a period of $65^{y.}$

Sir John Herschel had also predicted that, between 1839 and 1841, this star would have completed a full revolution from the epoch of the first measurement of its position in 1780, in a periodic time of about 59 years. M. Savary elaborately computed its orbit in 1830, making its period to be $58\frac{1}{4}$ years, and in his acute discussion of the details, adduces an equation due to the finite velocity of light. Indeed, of all the stellar orbital periods yet discussed, this of ξ Ursæ Majoris is admitted to be the most rigorously determined; and did we but know its parallax, and thence its absolute distance from the Earth, we might readily decide upon the linear extent of its orbit.

[The rapidity with which the position angle of this star changes has enabled a vast number of observations to be accumulated since Admiral Smyth's epoch. But notwithstanding this, our knowledge of its orbit is less precise than might be expected. There can be no doubt however that the period does not sensibly differ from 60 years. Dunér's elements are as follows:—

Peri-astron passage . . T = 1875·29
Longitude of peri-astron . λ = 132° 33′
Longitude of Ascending Node ☊ = 101° 30′ (Equinox, 1850·0)
Inclination . . . . γ = 56° 54′
Eccentricity . . . . ϵ = 0·3952
Mean Annual Motion . . μ = −5·92°
Semi-axis major . . . a = 2·549″
Period . . . . . . = 60·79$^{\text{yrs.}}$

699. ν URSÆ MAJORIS. (Σ. 1524.) CCCCVII.

	h.	m.	s.			s.
R. A.	11	12	32	Prec.	+	3·26
		°	′			″
Decl.	N	33	41·7	——	S	19·63

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	146·5	...	7·1	...	1830·69
SMYTH	147·2	...	7·8	...	1834·31
WILSON	147·1	...	7·1	...	1873·25
BURNHAM	146·0	...	7·0	...	1878·26

A delicate double star, on the Bear's left hind-foot, immediately above ξ, and therefore called *Al Ula Borealis.* A 4, orange tint; B 12, cerulean blue, preceded exactly on the equatorial line by a 7th mag. star, with Δ R.A.=21·5$^{\text{s}}$.

It is mentioned under No. 698 that this star with ξ forms a miniature of δ and θ Leonis, 10° to the S. of them; and for further identity it may be added that a W.S.W. ray from Cor Caroli to ϵ Leonis passes them in mid-distance.

700. 241 H. I. CRATERIS. (h. 3337; H. 2371.)

	h.	m.	s.			s.
R. A.	11	12	57	Prec.	+	2·90
		°	′			″
Decl.	S	32	12·5	——	S	19·63

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; v L; E 160° ±; am 4 st;" which means:—"considerably bright; very large; extended in the direction of about 160° with the meridian; amongst 4 stars." This is 617 Dunlop.

701. 339 B. LEONIS. (Σ. 1527.)

	h.	m.	s.		s.
R. A.	**11**	**13**	**14**	Prec. +	3·15
		°	′		″
Decl.	**N**	**14**	**52·4**	—— S	19·64

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	9·7	...	3·7	...	1822·20
Dawes	10·2	...	4·0	...	1840·60
Morton	11·6	...	3·9	...	1855·70
Talmage	12·8	...	3·6	...	1866·28
Dunér	14·4	...	3·4	...	1875·30

A double star. A 7, yellow; B 8½, blue. A may be variable: at least South puts it at 8; Dawes at 8, 7·2; Struve at 8, 6·9; Dunér at 6·5, 6. A slow increase in angle and decrease in distance seems probable.

702. 39 P. XI. CRATERIS. (Σ. 1530.) CCCCIX.

	h.	m.	s.		s.
R. A.	**11**	**14**	**10**	Prec. +	3·04
		°	′		″
Decl.	**S**	**6**	**17·7**	—— S	19·65

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	314·6	...	7·6	...	1830·23
Smyth	315·0	...	8·0	...	1836·29
Wilson and Seabroke	313·4	...	7·4	...	1874·22
Burnham	313·3	...	7·9	...	1880·22

A neat but minute double star, between the Cup and the Lion's hind-feet; and exactly 8° due N. of δ Crateris: a ray projected from δ Crateris to θ Leonis passes over it at nearly one-quarter of the distance. A 8½, and B 9, both bluish white; other small stars in the field.

703. 66 M. LEONIS. (h. 857; H. 2377; R.) CCCCX.

	h.	m.	s.		s.
R. A.	**11**	**14**	**22**	Prec. +	3·14
		°	′		″
Decl.	**N**	**13**	**34·9**	—— S	19·66

A large elongated nebula, with a bright nucleus, on the Lion's haunch, trending *np* and *sf*. This beautiful specimen of perspective lies just 3° S.E. of θ Leonis. It is preceded at about 73^{s} by another of a similar shape, which is 65 M., and both are in the field at the same time, under a moderate power, together with several stars. They were pointed out by Méchain to Messier in 1780, and they appeared faint and hazy to him. The sketch on the next page represents their appearance in my instrument.

The two preceding of these singular objects were examined by Sir W. Herschel, and his son also; and the latter says, "The general form of elongated nebulæ is elliptic, and their condensation towards the centre is almost invariably such as would arise from the superposition of luminous elliptic strata, increasing in density towards the centre. In many cases this increase of density is obviously attended with a diminution of ellipticity, or a nearer approach to the globular form in the central than in the exterior strata." He then supposes the general constitution of those nebulæ to be that of oblate spheroidal masses of every degree of flatness from the sphere to the disc, and of every variety in respect of the law of their density, and ellipticity towards the centre. This must appear startling and paradoxical to those who imagine that the forms of these systems are maintained by forces identical with those which determine the form of a fluid mass in rotation; because, if the nebulæ be only clusters of discrete stars, as in the greater number of cases there is every reason to believe them to be, no pressure can be propagated through them. Consequently, since no general rotation of such a system as one mass can be supposed, Sir John suggests a scheme which he shows is not, under certain conditions, inconsistent with the law of gravitation. "It must rather be conceived," he tells us, "as a *quiescent form*, comprising within its limits an indefinite multitude of individual constituents, which, for aught we can tell, may be moving one among the other, each animated by its own inherent projectile force, and deflected into an orbit more or less complicated, by the influence of that law of internal gravitation which may result from the compounded attractions of all its parts."

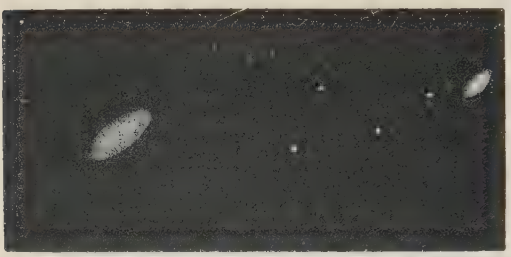

FIG. 19. 65 and 66 M. PERSEI.

[Engraved, *Phil. Trans.*, 1833, Pl. vi. Fig. 54; *Phil. Trans.*, 1861, Pl. xxvi. Fig. 16; Vogel, *Nebelflecken*, 1876, Pl. i. Fig. 5.]

704. 226 H. I. URSÆ MAJORIS. (h. 858; H. 2379; R.)

	h.	m.	s.			s.
R. A.	11	14	44	Prec.	+	3·43
		°	′			″
Decl.	N	53	46·0	——	S	19·67

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"p B; L; R; svmb M r N;" which means:—"pretty bright; large; round; suddenly very much brighter in the middle where there is a resolveable nucleus." Engraved, Rosse, woodcut, *Phil. Trans.* 1861.

705. 5 H. I. LEONIS. (h. 873; H. 2396; R.)

	h.	m.	s.			s.
R. A.	**11**	**17**	**7**	Prec.	+	3·15
		°	′			″
Decl.	**N**	**17**	**11·6**	——	S	19·71

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p S: i R; b M; r;" which means:—"pretty bright; pretty small; irregularly round; bright in the middle; resolveable."

706. ι LEONIS. (Σ. 1536.) CCCCXI.

	h.	m.	s.			s.
R. A.	**11**	**18**	**11**	Prec.	+	3·12
		°	′			″
Decl.	**N**	**11**	**8·4**	——	S	19·72

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	97·0	...	2·30	...	1827·28
Smyth	86·0	...	2·5	...	1843·38
Secchi	76·4	...	2·26	...	1856·26
Dembowski	74·9	...	2·56	...	1866·10
Jedrzejewicz	66·7	...	2·69	...	1878·33

A binary star on the Lion's flank; 7° S.W. of β Leonis, with which star and θ it forms a neat scalene triangle, of which it is the southern vertex. A 4, pale yellow; B 7½, light blue. A binary system.

707. 4737 Lac. CARINÆ. (*h. 4432.)

	h.	m.	s.			s.
R. A.	**11**	**18**	**36**	Prec.	+	2·55
		°	′			″
Decl.	**S**	**64**	**21·3**	——	S	19·73

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	288·5	...	2·37	...	1836·27
Santiago Obs.	202·2	...	4·5	...	1850·28

A double star. A 6; B 8. A considerable change of angle and distance would seem to have taken place, but no other observations are known to me.

708. 219 H̥. I. URSÆ MAJORIS. (h. 881; H. 2404; ℜ.) CCCCXII.

		h.	m.	s.			s.
R. A.		11	18	44	Prec.	+	3·27
		°	′				″
Decl.	N	39	21·8		——	S	19·73

A bright-class nebula, before the animal's left hind-leg, nearly in a line with 4 telescopic stars to the S. from the 9th to the 11th mags.—two of which precede, and two follow; the latter are the smallest and by far the nearest. It is small, round, and lucid white; and H. says it is resolveable. Assuredly it is most wonderful that this object—apparently about 40″ or 50″ in diameter—should present a remote universe; yet the resolveability implies the existence of an immense number of stars at a proximity apparently much greater than those in our own Via Lactea. Indeed it has been shown that clustering collections of stars may easily contain upwards of 50,000 of them!

This nebula is nearly in mid-distance between ε Ursæ Majoris and α Leonis, and exactly between Flamsteed's 55 and 57 Ursæ Majoris.

[" A faint nebula in 7½in refractor."—*Brodie.*]

709. γ CRATERIS. CCCCXIII.

		h.	m.	s.			s.
R. A.		11	19	23	Prec.	+	2·99
		°	′				″
Decl.	S	17	4·7		——	S	19·74

	Position.		Distance.		Epoch.
	°		″		
SMYTH	102·5	...	3	...	1838·26
STONE, O.	98·3	...	5·1	...	1877·21

A close double star, in the centre of the Goblet, and 3° S.S.E. of δ, the present lucida. A 4, bright white; B [10], grey, a star of the 11th mag. following nearly on the parallel, in the line of A and B, at about 25s; and the 8th mag. star mentioned by Piazzi, Note 62, Hora XI., is at a distance in the *np.* This fine but delicate object, erroneously lettered χ in the Palermo Catalogue, was discovered by H. in his 20ft Sweeps: the acolyte was sufficiently visible in my telescope for the rock-crystal, or for exact estimation, but was utterly "obnubilated" under the slightest artificial light.

710. 131 H̥. I. CRATERIS. (h. 886; H. 2411; ℜ.)

		h.	m.	s.			s.
R. A.		11	19	28	Prec.	+	3·03
		°	′				″
Decl.	S	9	11·7		——	S	19·75

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"p B; L; E 0° ±; gb M;" which means:—"pretty bright; large; extended in the direction of the meridian or thereabouts; gradually brighter in the middle."

711. 194 H. I. URSÆ MAJORIS. (h. 887; H. 2413; R.)

CCCCXIV.

		h.	m.	s.			s.
R. A.		11	20	6	Prec.	+	3·30
		°	′				″
Decl.	N	44	11·5		——	S	19·75

A large elongated nebula, between the Greater Bear's hind knees, with two minute stars about twice as far to the S. of it, as they are from each other. This nebula is pale white, and brightish towards the centre, and its axis of extension is preceded by star-dust; but it presents an ill-defined surface, and has the appearance of a flat stratum seen obliquely. About 1° *nf* 56 Ursæ.

712. 481 Dunlop CENTAURI. (h. 3342; H. 2418.)

		h.	m.	s.			s.
R. A.		11	20	23	Prec.	+	2·86
		°	′				″
Decl.	S	42	37·7		——	S	19·76

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; c L; p Ri; l C; st 10 . . . 14;" which means:—"a cluster; considerably large; pretty rich; little compressed; the component stars vary from the 10th to the 14th magnitudes."

713. 262 H. I. MUSCÆ. (h. 890; H. 2420)

		h.	m.	s.			s.
R. A.		11	21	7	Prec.	+	3·62
		°	′				″
Decl.	N	67	11·6		——	S	19·77

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; S; i R; spmb MN;" which means:—"considerably bright; small; irregularly round; suddenly pretty much brighter in the middle where there is a nucleus."

714. 83 LEONIS. (Σ. 1540.) CCCCXV.

R. A.	11h 21m 13s	Prec. + 3s·09
Decl.	N 3° 36′·7	—— S 19″·77

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	144·9	29·0	1780·27
HERSCHEL, J., and SOUTH	151·1	29·5	1821·20
STRUVE, W.	150·0	29·5	1832·71
SMYTH	150·8	29·8	1839·22
MAIN	149·3	29·9	1862·25
JEDRZEJEWICZ	150·5	29·5	1878·80

A neat double star, on Leo's right hind-leg, closely *np* τ Leonis, which lies 21° E.S.E. of *a*. A 8, silvery white; B 9, pale rose-tint. A comparison of the several measures, while it shows the distance to be stationary, does not confirm the suspected direct change in the orbital angle. The difference, therefore, between ♅. and recent observers must be attributed to instrumental error.

The object is of very easy measurement, and therefore its fixity may be deemed to be established.

715. 246 ♅. I. URSÆ MAJORIS. (h. 892; H. 2421; ℞.)

R. A.	11h 21m 16s	Prec. + 3s·43
Decl.	N 57° 29′·2	—— S 19″·77

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; E;" which means:—"considerably bright; pretty large; extended."

716. 247 ♅. I. URSÆ MAJORIS. (h. 896; H. 2425; ℞.)

R. A.	11h 22m 28s	Prec. + 3s·44
Decl.	N 59° 9′·3	—— S 19″·80

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p S; vl E 80° ±; p gb M; S st sf nr;" which means:—"pretty bright; pretty small; very slightly elongated in the direction of about 80° with the meridian; pretty gradually brighter in the middle; there is a small star on the *sf* side, near."

717. 57 URSÆ MAJORIS. (Σ. 1543.) CCCCXVI.

	h.	m.	s.			s.
R. A.	11	23	9	Prec.	+	3·26
		°	′			″
Decl.	N	39	56·5	——	S	19·80

	Position.		Distance.		Epoch.
	°		″		
SOUTH	10·3	...	5·86	...	1825·25
STRUVE, W.	10·7	...	5·3	...	1831·91
SMYTH	9·9	...	5·9	...	1835·42
SECCHI	6·5	...	5·16	...	1857·89
BURNHAM	7·1	...	5·43	...	1878·42

A neat double star, on the Bear's left hind-leg, nearly midway on a line produced between ϵ Ursæ Majoris and *α* Leonis. A 6, lucid white; B 9, violet. This is a beautiful object. A slight orbital change was inferred, [and this is confirmed by recent observations].

Another remark is called for: Ħ. says that the small star is "a red point without sensible magnitude;" and S., upwards of half a century afterwards, rated it of the 10th lustre, as shown by his 7ft telescope. In the summer of 1835 it was very distinct, being a bright 9th size, bearing illumination admirably. Is it variable?

718. 81 P. XI. CENTAURI.

	h.	m.	s.			s.
R. A.	11	23	16	Prec.	+	2·86
		°	′			″
Decl.	S	42	4·1	——	S	19·80

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	166·9	...	12·9	...	1835·26

A double star. A 6; B 8.

719. 91 P. XI. LEONIS. (Σ. 3072.) CCCCXVIII.

	h.	m.	s.			s.
R. A.	11	25	15	Prec.	+	3·05
		°	′			″
Decl.	S	6	6·7	——	S	19·83

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	331·8	...	9·3	...	1831·65
SMYTH	330·2	...	9·5	...	1834·30
STONE, O.	328·7	...	9·4	...	1879·33
BURNHAM	330·4	...	9·5	...	1880·22

A fine but very delicate double star, in a barren field, under the Lion's hind-paw; it lies S. of a line from *η* Virginis to *α* Hydræ, and one-fourth of the way, where it is also two-thirds of the distance between *β* Leonis and δ Crateris. A 8, creamy white; B 11, greenish, and rather more difficult under illumination than its magnitude quite warrants.

720. 88 LEONIS. (Σ. 1547.) CCCCXIX.

	h. m. s.		s.
R. A.	11 26 5	Prec. +	3·13
	° ′		″
Decl.	N 14 58·8	—— S	19·84

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	317·5	...	14·6	...	1782·11
STRUVE, W.	319·9	...	15·3	...	1829·02
SMYTH	319·8	...	14·9	...	1835·38
MAIN	320·5	...	14·7	...	1861·33
JEDRZEJEWICZ	323·8	...	15·3	...	1878·31

A neat double star, on Leo's flank, nearly midway between β and θ. A 7, topaz yellow; B 9, pale lilac; a third star of the 10th mag. follows in the *sf* quadrant. This is a good object, although it rather weakens under illumination.

[According to Struve both stars are endowed with a common proper motion.]

721. 221 H. I. URSÆ MAJORIS. (h. 908; H. 2443; R.)

	h. m. s.		s.
R. A.	11 26 26	Prec. +	3·34
	° ′		″
Decl.	N 53 40·7	—— S	19·84

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; v L; R; vgl b M;" which means:—"pretty bright; very large; round; very gradually less bright in the middle."

722. 17 CRATERIS. CCCCXX.

	h. m. s.		s.
R. A.	11 26 49	Prec. +	2·96
	° ′		″
Decl.	S 28 39·6	—— S	19·85

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	205·5	...	9·7	...	1783·03
SMYTH	207·8	...	10·1	...	1833·21
HERSCHEL, J.	30·2	...	8·9	...	1835·11
WROTTESLEY	211·4	...	8·8	...	1857·29
STONE, O.	31·3	...	8·7	...	1877·10

A neat double star, of which A is 5½, lucid white; and B 7, violet tint. This object is situated in the far S., about 15° S. by E. of δ Crateris, its *lucida;* and there it is also pointed to by a ray from *a* Virginis through *a* in the Raven's beak. Though on Hydra's back, it is in the Crater's boundary, and albeit Bayer's stars in that asterism do not exceed 11, Flamsteed numbered it as above, in the *British Catalogue*, having carried his numeration up to 31.

The observations are as coincident as can be expected, under the variable refractions with which the place of this star is troubled.

Now had not B been physically connected with A, it seems clear that their situations regarding each other ought to have varied in 40 years owing to proper motion. Even Baily's reduced value, although it would let the position alone, would have increased the distance to 15·7″.

[Magnitudes much more nearly equal than stated by Smyth, according to Sir J. Herschel at the Cape, 1835, Webb, 1852, and Lord Wrottesley, 1857.]

723. 222 ♅. I. URSÆ MAJORIS. (h. 911; H. 2447; R.)

	h.	m.	s.		s.
R. A.	11	27	42	Prec. +	3·33
	°	′			″
Decl.	N 53	44·3		—— S	19·86

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“p B; p L; l E 0° ±; g b M; *12 nr;” which means:—“pretty bright; pretty large; slightly elongated in the direction of the meridian or thereabouts; gradually brighter in the middle; there is a 12th mag. star near.”

724. 90 LEONIS. (Σ. 1552.) CCCCXXI.

	h.	m.	s.		s.
R. A.	11	28	59	Prec. +	3·13
	°	′			″
Decl.	N 17	24·4		—— S	19·87

		Position.	Distance.	Epoch.
		°	″	
Smyth	A B	209·1	3·5	1835·38
	A C	233·9	58·8	
Secchi	A B	214·1	3·5	1865·33
	A C	234·5	63·3	

A triple star in the root of Leo's tail, *infra eductionem caudæ,* where it will be found 4° W.N.W. of *β* Leonis, nearly on the line shot from that star towards δ Leonis. A 6, silvery white; B 7½, purplish; C 9½, pale red. This is a fine object.

[“A B, probably binary: in A C, rectilinear motion.”—*Gledhill.*]

725. 287 Ḩ. I. DRACONIS. (h. 914; H. 2452.)

R. A.	11h 29m 32s	Prec.	+ 3s·60
Decl.	N 71° 8′·5	——	S 19″·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"pB; L; mE 130·4°; mbM;" which means:—"pretty bright; large; much extended in the direction of 130·4° with the meridian; much brighter in the middle."

726. 111 P. XI. URSÆ MAJORIS. (Σ. 1555.) CCCCXXII.

R. A.	11h 30m 30s	Prec.	+ 3s·17
Decl.	N 28° 23′·5	——	S 19″·89

		Position.	Distance.	Epoch.
		°	″	
Struve, W.	A B	339·3	1·25	1829·12
Smyth	A B	340·1	1·4	1834·31
	A C	145·0	17	
Secchi	A B	339·0	0·80	1855·95
Engelmann	A C	142·4	13·4	1865·27
Doberck	A B	337·1	0·71	1877·33

A fine and delicate triple star, under the left hind-leg of Ursa. A 6, and B 7, both pale blue; C [12], plum colour.

Here a typographical error has crept into H.'s first series of 7ft measures, 111 Piazzi being designated 3. At a distance in the *sf* is the star mentioned in the Palermo Catalogue: "Alia 8æ magnitud. sequitur 57″ temporis, 20″ circiter ad austrum." It is situated in a very vacant space to the eye, about 8° from δ Leonis, in a N.N.E. direction towards ζ Ursæ Majoris; but, to the powerful reflectors now in use, is in a very ocean of nebulæ.

727. 289 Dunlop CENTAURI. (h. 3352; H. 2468.)

R. A.	11h 31m 4s	Prec.	+ 2s·76
Decl.	S 60° 59′·4	——	S 19″·90

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; pL; pRi; pC; st 8 ... 13;" which means:—"a cluster; pretty large; pretty rich; pretty condensed; the component stars range from the 8th to the 13th magnitudes."

728. 284 B. URSÆ MAJORIS. (Σ. 1559.)

	h.	m.	s.			s.
R. A.	11	32	39	Prec.	+	3·46
		°	′			″
Decl.	N	64	57·1	——	S	19·91

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	322·7	2·05	1831·50
Main	318·6	2·38	1866·53

A double star. A 7, white; B 8, white.

729. 126 P. XI. VIRGINIS. (Σ. 1560.) CCCCXXIII.

	h.	m.	s.			s.
R. A.	11	32	47	Prec.	+	3·06
		°	′			″
Decl.	S	1	49·6	——	S	19·92

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	280·5	5·1	1831·58
Smyth	280·9	5	1833·27
Stone, O.	280·5	5·1	1878·96

A fine but very delicate double star, between Leo's hind-paw and the Virgin's wing. A 7, pale orange; B 12, reddish,—with a distant dull star in the *sf.* This beautiful object, far too delicate for a small instrument, was discovered by Σ.

This star may be fished up about 5° S.S.W. of β Virginis.

730. 290 B. URSÆ MAJORIS. (Σ. 1561.)

	h.	m.	s.			s.
R. A.	11	33	2	Prec.	+	3·25
		°	′			″
Decl.	N	45	43·1	——	S	19·92

		Position.	Distance.	Epoch.
		°	″	
Struve, W.		266·0	10·4	1831·68
Main	A B	263·2	10·2	1864·45
	B C	268·6	82·2	

A double star. A 6, yellowish white; B 8½, ash.

731. — ANTLIÆ. (*h. 4463.)

R. A.	11h 35m 4s	Prec. + 2s·96
Decl.	S 32° 58'·0	—— S 19"·94

	Position.		Distance.		Epoch.
HERSCHEL, J.	248°·3	...	2½" *est.*	...	1835·09

A double star. A 6, yellow; B 8. Sir J. Herschel calls this "a fine star," but he gives no micrometrical measures of its distance.

732. 21 ♅. I. LEONIS. (h. 943; H. 2499; 𝕽.)

R. A.	11h 35m 19s	Prec. + 3s·10
Decl.	N 12° 4'·9	—— S 19"·94

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; v l E;" which means:—"bright; large; very little extended."

733. 94 ♅. I. URSÆ MAJORIS. (h. 945; H. 2501; 𝕽.)

CCCCXXIV.

R. A.	11h 35m 27s	Prec. + 3s·18
Decl.	N 37° 9'·4	—— S 19"·94

A nebula, at the back of the Bear's hind-leg, of a pale white tint. It is elliptical, and though large, is so faint as not to be readily made out, till the equatorial clock fixes the telescope upon it, when it *rises* to view, lying slightly across the parallel, with a following star. The space around is apparently blank and starless. ♅. and H. contradict one another as to the direction in which the elongation shows itself. The former says N. to S.; the latter, "in the parallel."

734. 201 ♅. I. URSÆ MAJORIS. (H. 2545.)

R. A.	11h 40m 32s	Prec. + 3s·20
Decl.	N 48° 6'·0	—— S 19"·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; m E 25° ± ;" which means:—"bright; large; much extended in the direction of about 25° with the meridian." Rumker's R. A. is less by 14^{s}.

735. 120 ♅. I. CRATERIS. (h. 979, 3360; H. 2554; 𝕽.)

	h.	m.	s.			s.
R. A.	11	41	28	Prec.	+	3·04
		°	′			″
Decl.	S	16	14·9	——	S	19·99

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; L; i R; v g p m b M;" which means:—"pretty bright; large; irregularly round; very gradually pretty much brighter in the middle."

736. 248 ♅. I. URSÆ MAJORIS. (h. 983; H. 2560; 𝕽.)

	h.	m.	s.			s.
R. A.	11	42	56	Prec.	+	3·25
		°	′			″
Decl.	N	60	1·3	——	S	19·99

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; i R; p g m b M; p of 2;" which means:—"bright; pretty large; irregularly round; pretty gradually much brighter in the middle; the preceding of 2 nebulæ." The other nebula here spoken of follows at a distance of 11s, and about 1′ to the N. It is described as "pretty faint; pretty large; very little extended; gradually brighter in the middle."

737. 1573 Σ. DRACONIS.

	h.	m.	s.			s.
R. A.	11	43	11	Prec.	+	3·36
		°	′			″
Decl.	N	67	56·0	——	S	20·00

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	177·9	...	11·1	...	1832·71
MAIN	177·2	...	11·3	...	1864·45

A double star. A 7, white; B 8, white.

738. 228 ♅. I. URSÆ MAJORIS. (h. 985; H. 2564; 𝕽.)

	h.	m.	s.			s.
R. A.	11	43	22	Prec.	+	3·22
		°	′			″
Decl.	N	56	41·6	——	S	20·00

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; l E; s v m b M;" which means:—"bright; pretty large; little extended; suddenly very much brighter in the middle."

739. 82 H̥. I. URSÆ MAJORIS. (h. 988; H. 2566; R.)

	h.	m.	s.			s.
R. A.	11	43	26	Prec.	+	3·12
		°	′			″
Decl.	N	27	38·3	——	S	20·00

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; vl E 0° ±; b M N;" which means:—"bright; pretty large; a very little extended in about the direction of the meridian; brighter in the middle where there is a nucleus."

740. β LEONIS. CCCCXXV.

	h.	m.	s.			s.
R. A.	11	43	27	Prec.	+	3·10
		°	′			″
Decl.	N	15	11·2	——	S	19·99

	Position.	Distance.	Epoch.
	°	″	
Smyth	114	298	1833·47

A *Nautical Almanac* star, with several companions, on the switch of Leo's tail. A 2½, bluish; B 8, dull red; preceded by a 7th magnitude star in the *np*.

[Knott's account of the companions of A is hopelessly at variance with Smyth's. Knott finds:—A 2½, bluish; B 8; C 10; D 7; E 12; F 11; with angles and distances as follows:—

		°	′	″	
Knott	A B	206·2	4	42	1864·37
	A C	186·9	11	30	
	A D	201·6	19	30	
	A E	116·1	5	3	
	A F	120 *est.*	10	*est.*	

If Knott's E is identical with Smyth's B there is an enormous discrepancy in the estimates of magnitude. On the other hand, if Knott's B is identical with Smyth's B there is an enormous discrepancy in angle and some in distance. However, in a letter to Fletcher dated June 6, 1864, Smyth states:—"It seems that by some stupidity or other I may have read the angle of position short by a quadrant, for adding 90° will place it sufficiently near." [Burnham has found another companion in Pos. 345°; Dist. 77″; Epoch 1878·24. The same observer has also discovered that Knott's D is a close double:—Pos. 337°; Dist. 1·52″; Epoch 1878·21; Mags. 6½ and 11.]

This star is named Denebola, from the Arabian *dhanab-al-asad*, the lion's tail. A line from Procyon through α Leonis passes θ, and over β

Leonis, the latter being about 25° from α; or, for eye measurement in aligning, half as far from α, as the latter is from Procyon. If seeking it from the E., drop a line from η Ursæ Majoris, lead it through Cor Caroli, and extend it about double the distance between those two stars into the S.W. The brackish rhymes point out a nearly equilateral figure, thus:

> From Deneb, in the Lion's tail, to Spica draw a line,
> Then will these two with Arcturus a bright triangle shine.

741. 3365 h. CENTAURI. (H. 2581.)

	h.	m.	s.			s.
R. A.	11	44	51	Prec.	+	2·93
		°	′			″
Decl.	S	56	34·1	——	S	20·01

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“○; !; S; R; blue; =*7 m; $1{\cdot}5^{s}$=d;” which means:—“a planetary nebula; remarkable; small; round; blue; resembles a 7th mag. star; diameter $1{\cdot}5^{s}$ of R.A.”

742. 259 H. I. CRATERIS. (h. 2366; H. 2586.)

	h.	m.	s.			s.
R. A.	11	45	28	Prec.	+	3·02
		°	′			″
Decl.	S	28	13·1	——	S	20·01

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“B; pL; lE; gmbM; r; vs * sp inv;” which means:—“bright; pretty large; little extended; gradually much brighter in the middle; resolveable; there is a very small star involved on the *sp* side.”

743. 203 H. I. URSÆ MAJORIS. (h. 1002; H. 2597; R.)

	h.	m.	s.			s.
R. A.	11	47	4	Prec.	+	3·15
		°	′			″
Decl.	N	44	44·4	——	S	20·02

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“B; vL; R; bMpBN; er;” which means:—“bright; very large; round; brighter in the middle where it exhibits a pretty bright nucleus; easily resolveable.” Engraved, Rosse, woodcut, *Phil. Trans.*, 1861.

744. 170 P. XI. LEONIS. CCCCXXVII.

	h.	m.	s.			s.
R. A.	11	47	6	Prec.	+	3·10
	°	′				″
Decl.	N 16	3·2		——	S	20·02

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	19·2	...	37·2	...	1782·09
Herschel, J., and South	14·1	...	37·1	...	1823·28
Smyth	13·4	...	35·0	...	1832·99
Stone, O.	14·6	...	39·4	...	1879·34

A double star, in the brush of Leo's tail, and following β at about 1° to the N.E. A 7½, pearl white; B 9½, livid.

745. 173 H. I. URSÆ MAJORIS. (h. 1005; 2600; R.) CCCCXXVIII.

	h.	m.	s.			s.
R A.	11	47	12	Prec.	+	3·13
	°	′				″
Decl.	N 37	36·2		——	S	20·02

A bright-class nebula, of a pale white tint, with a central blaze, between the Bear's hind-legs and the Hounds. When seen by strong moonlight, it looks like a star in a burr; but in dark nights has a very large apparent diameter [4′ by 3′ at Parsonstown]. Its site is known by glancing from η Ursæ Majoris, at the tip of the Greater Bear's tail, towards α Leonis, and it is passed at rather less than half the distance. But the immediate vicinity is very poor to the unassisted eye.

746. β CRATERIS. (*h. 4478.)

	h.	m.	s.			s.
R. A.	11	47	22	Prec.	+	3·01
	°	′				″
Decl.	S 33	18·0		——	S	20·03

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	339·6	...	2·03	...	1835·85
Herschel, J.	342·2	...	*not stated*	...	1838·09
Stone, O.	344·6	...	1·98	...	1877·13

A double star. A 5; B 5. The above and some other angles by Sir J. Herschel which I do not give imply an increase of angle, though the intervals of time are too short to be very conclusive.

747. 251 H. I. URSÆ MAJORIS. (h. 1006; H. 2602; ℜ.)

	h.	m.	s.			s.
R. A.	11	47	26	Prec.	+	3·21
	°	′				″
Decl.	N 61	16·8		——	S	20·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; gmbM; r; *f;" which means:—"bright; pretty large; round; gradually much brighter in the middle; resolveable; a star follows." Rumker and D'Arrest say that the star *precedes.*

748. 202 H. I. URSÆ MAJORIS. (h. 1009; H. 2604; ℜ.)

	h.	m.	s.			s.
R. A.	11	47	56	Prec.	+	3·15
	°	′				″
Decl.	N 48	28·0		——	S	20·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"cB; pL; pmE; vgbM;" which means:—"considerably bright; pretty large; pretty much extended; very gradually brighter in the middle."

749. 45 H. V. URSÆ MAJORIS. (h. 1011; H. 2606; ℜ.) CCCCXXX.

	h.	m.	s.			s.
R. A.	11	48	4	Prec.	+	3·18
	°	′				″
Decl.	N 53	57·0		——	S	20·03

A large pale-white nebula, on the Bear's right haunch, about 1½° S. of γ. It has a peculiar appearance in the field, from there being a coarse small double star to the N. of it, and from its being followed by a vertical line of 5 equidistant telescopic stellar attendants. This object is fine, but, in my instrument, faintish; it brightens towards the middle; and H. says there is, in that part, an *unconnected* star, the which I cannot make out. [But Brodie "glimpsed" it clearly with 8½in refractor. "It precedes the nebula, say 2′ or 3′ of arc."]

From every inference this nebula is a vast and remote globular cluster of worlds, for H. assures us it is actually resolveable. By its blazing towards the centre, proof is afforded that the stars are more condensed there than round its margin, an obvious indication of a clustering power directed from all parts towards the middle of the spherical group. In other words, the whole appearance affords presumptive evidence of a wonderful physical fact,—the actual existence of a central force.

[Engraved, *Phil. Trans.*, 1861, Pl. xxvi. Fig. 17.]

750. 349 Dunlop CENTAURI. (h. 3369; H. 2614.)

	h.	m.	s.		s.
R.A.	11	48	58	Prec. −	2·98
		°	′		″
Decl.	S	55	6·4	—— S	20·03

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p Ri; gplmb M; st 13;" which means:—"a cluster; pretty large; pretty rich; gradually pretty much brighter in the middle; the stars are of mag. 13." The "l" in the 4th member of the above abbreviated sentence appears to have been inserted by mistake.

751. 67 Ḩ. I. CRATERIS. (h. 3370; H. 2616; R.)

	h.	m.	s.		s.
R.A.	11	49	3	Prec. +	3·06
		°	′		″
Decl.	S	13	21·5	—— S	20·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; i R; gmb M; Δ 2 st;" which means:—"considerably bright; pretty large; irregularly round; gradually much brighter in the middle; forms a triangle with 2 stars."

752. 65 URSÆ MAJORIS. (Σ. 1579; 20 App. I.) CCCCXXXI.

	h.	m.	s.		s.
R.A.	11	49	23	Prec. +	3·15
		°	′		″
Decl.	N	47	5·4	—— S	20·03

		Position.	Distance.	Epoch.
		°	″	
HERSCHEL, W.	A B	36·2	4·0 ±	1782·89
	A C	112·3	60·0	
SMYTH	A B	35·8	3·8	1837·39
	A C	115·0	63·5	
MAIN	A C	113·2	62·9	1866·53
JĘDRZEJEWICZ	A B	36·9	3·8	1877·44
	A C	113·9	63·0	

A triple star, on the Bear's left thigh. A 7, bright white; B 9½, pale purple; C 7, white. The various measures hitherto taken indicate fixity.

The magnitude which I have assigned, on mature comparison, to B, does not altogether quadrate with Ḩ.'s description of its being a mere point, which would hardly be suspected. It may be variable; and I have reason also to think C is. Probably all three are physically connected, in which case they will partake of the slow proper motions of A.

There is therefore reasonable ground for supposing that this object will increase in interest. It is easily fished up by carrying a ray from the Pole-star, between κ and λ Draconis, through γ Ursæ Majoris, and 7° S. of it, where it will meet a cross line from ψ to η. [Or it may be said to be 2° *sf* χ.]

753. 62 ♅. IV. URSÆ MAJORIS. (h. 1017; H 2620; 𝕽.) CCCCXXXII.

		h.	m.	s.			s.
R. A.		11	50	41	Prec.	+	3·16
Decl.	N	55°	44′·1		——	S	20″·04

A planetary nebula, in a barren field, on the Bear's hind-quarter. It is small, and uniformly of a pale bluish-white colour, but exceedingly well-defined, without the haziness mentioned by H. in *Phil. Trans.*, 1833, (in which it is No. 1017); but I certainly had a splendid night for the examination, with the instrument in capital working order. There is a lilac-tinted 10th magnitude star on its S. vertical. It is only about 1½° N. by E. of γ Ursæ Majoris.

["There is another nebula about 30′ to the N. of this one."—*Brodie.* But I cannot feel sure whether Brodie refers to H. 2634 or H. 2637. Both follow the present object about 2^{m} and both are 20′ to the N.]

754. 223 ♅. I. URSÆ MAJORIS. (h. 1047; H. 2660; 𝕽.)

		h.	m.	s.			s.
R. A.		11	53	40	Prec.	+	3·12
Decl.	N	51°	34′·2		——	S	20″·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; c L; m E 160° ± ; vsvmb MBN;" which means:—"very bright; considerably large; much extended in the direction of about 160° with the meridian; very suddenly very much brighter in the middle where there is a bright nucleus."

755. 121 ♅. I. VIRGINIS. (h. 1048; H. 2663; 𝕽.)

		h.	m.	s.			s.
R. A.		11	54	44	Prec.	+	3·07
Decl.	S	0°	29′·1		——	S	20″·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; vl E; psmb M; B st nr;" which means:—"considerably bright; large; very little elongated; pretty suddenly much brighter in the middle; there is a bright star near."

756. 253 ♅. I. URSÆ MAJORIS. (h. 1050; H. 2668.)

		h.	m.	s.		s.
R. A.		11	55	45	Prec. +	3·12
			°	′		″
Decl.	N		62	30·0	—— S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; E;" which means:—"very bright; very large; extended."

But Sir J. Herschel's own account is very different from his father's, being as follows:—"p B; 25″; R;"="pretty bright; 25″ in diameter; round." D'Arrest and Schultz however both agree with Sir William Herschel, and as the places of all 4 tally, Sir J. Herschel must have viewed the object under some specially unfavourable conditions.

757. 252 ♅. I. URSÆ MAJORIS. (h. 1054; H. 2672.)

		h.	m.	s.		s.
R. A.		11	56	32	Prec. +	3·12
			°	′		″
Decl.	N		62	44·8	—— S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; c L; R; g, psvmb M r N;" which means:—"bright; considerably large; round; at first gradually, then suddenly very much brighter in the middle where there is a round nucleus."

758. 174 ♅. I. COMÆ BERENICIS. (h. 1066; H. 2687; ℜ.)

		h.	m.	s.		s.
R. A.		11	58	25	Prec. +	3·08
			°	′		″
Decl.	N		32	30·4	—— S	20·06

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; v L; m E 97°; vgb M;" which means:—"pretty bright; very large; much extended in the direction of 97° with the meridian; very gradually brighter in the middle."

759. 2 COMÆ BERENICIS. (Σ. 1596.) CCCCXXXIII.

		h.	m.	s.		s.
R. A.		11	58	39	Prec. +	3·08
			°	′		″
Decl.	N		22	4·5	—— S	20·06

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	242·3	...	4·00 ±	...	1782·30
Struve, W.	239·9	...	3·82	...	1837·28
Smyth	239·9	...	3·6	...	1839·37
Gledhill	239·8	...	3·6	...	1874·30

A neat double star just over the Lion's tail; and nearly mid-way between its own *lucida* and β Leonis, but preceding the imaginary line so produced. A 6, pearly white; B 7½, lilac tint. This is a beautiful object, and having been rigidly examined, is concluded to have no motion appreciable.

My last measures of this star were so satisfactory, that I place the greatest reliance on them. The night was truly superb, and the definition of the objects so exquisite, that they resembled two jewels fixed in the field. Indeed, under the Claude Lorraine illumination, they were admirably sharp and tranquil; the vision therefore might almost be styled perfect. Under such circumstances, with the instrument in the finest working order, and the eye so turned, by inclining my head, as to have its principal section parallel to the wires, the results could hardly fail of being among the best I ever obtained.

[The coincidence of the above measures, extending as they do over 47 years, is very remarkable.]

760. 224 H. I. URSÆ MAJORIS. (H. 2707; R.)

	h. m. s.			s.
R. A.	12 0 12	Prec.	+	3·07
	° ′			″
Decl.	N 50 53·9	——	S	20·06

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; pm E; vsb M;" which means:—"bright; pretty large; pretty much extended; very suddenly brighter in the middle."

761. 206 H. I. URSÆ MAJORIS. (H. 2708; R.)

	h. m. s.			s.
R. A.	12 0 14	Prec.	+	3·07
	° ′			″
Decl.	N 51 7·6	——	S	20·06

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; c L; pm E 135° ±; lb M;" which means:—"bright; considerably large; pretty much extended in the direction of about 135° with the meridian; a little brighter in the middle."

762. 207 ♅. I. URSÆ MAJORIS. (h. 1081; H. 2711; R.)

	h.	m.	s.			s.
R. A.	12	0	24	Prec.	+	3·07
		°	′			″
Decl.	N	48	5·4	——	S	20·06

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; v L; m E 32·0°;" which means:—"pretty bright; very large; much extended in the direction of 32° with the meridian."

763. 3918 Brisb. CENTAURI. (*h. 4495.)

	h.	m.	s.			s.
R. A.	12	0	26	Prec.	+	3·06
		°	′			″
Decl.	S	32	20·6	——	S	20·06

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	313·8	...	7·1	...	1836·21
STONE, O.	315·7	...	6·7	...	1877·11

A double star. A 7; B 9½.

764. 3921 Brisb. MUSCÆ. (*h. 4498.)

	h.	m.	s.			s.
R. A.	12	0	38	Prec.	+	3·04
		°	′			″
Decl.	S	65	5·9	——	S	20·06

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	58·8	...	15 *est.*	...	1835·33
SANTIAGO OBS.	68·0	...	9·6	...	1850·28

A double star. A 7; B 9.

765. 225 ♅. I. URSÆ MAJORIS. (h. 1085; H. 2717; R.)

	h.	m.	s.			s.
R. A.	12	0	47	Prec.	+	3·07
		°	′			″
Decl.	N	53	19·4	——	S	20·06

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p s; R; b MB r N; * 12 sp, v, nr;" which means:—"bright; pretty small; round; brighter in the middle where there is a bright round nucleus; there is a 12th mag. star on the *sp* side very near."

766. 291 Dunlop CRUCIS. (h. 3377; H. 2718.)

	h.	m.	s.			s.
R. A.	12	1	0	Prec.	+	3·07
Decl.	S	60°	38′·0	——	S	20″·06

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p C; i R; st 10 . . . 14;" which means:—"a cluster; pretty large; pretty condensed; irregularly round; the component stars vary from the 10th to the 14th magnitude."

767. 195 ♅. I. URSÆ MAJORIS. (h. 1088; H. 2723; ℜ.) CCCCXXXIV.

	h.	m.	s.			s.
R. A.	12	1	24	Prec.	+	3·07
Decl.	N	43°	40′·6	——	S	20″·06

A bright-class nebula, in a poor field, behind the Greater Bear's left hind-leg, at rather more than one-third of the distance from δ Ursæ Majoris towards β Leonis, where it is within a degree to the E. by N. of 67 Ursæ, a star of $5\frac{1}{2}$ magnitude. It is of a lucid white colour, and narrow, being elongated in the direction of *np* and *sf*. In the *nf* quadrant is a fine wide double star, the individuals of which point exactly to the centre of the nebula, on a line forming an angle of about 230° with the meridian. The annexed was its appearance in the field of view.

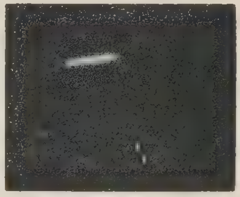

FIG. 20.
195 ♅. I. URSÆ MAJORIS.

768. 33 ♅. I. VIRGINIS. (h. 1094; H. 2734; ℜ.)

	h.	m.	s.			s.
R. A.	12	2	33	Prec.	+	3·07
Decl.	N	10°	59′·4	——	S	20″·06

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p L; m E 120°; b M; r;" which means:—"pretty bright; pretty large; much elongated in the direction of 120° with the meridian; brighter in the middle; resolveable."

769. 1603 Σ. URSÆ MAJORIS.

	h.	m.	s.			s.
R. A.	12	2	38	Prec.	+	3·07
		°	′			″
Decl.	N	56	5·0	——	S	20·06

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	80·5	22·4	1832·18
Dawes	81·4	22·4	1851·29
Main	78·7	22·9	1863·25

A double star. A 7½, white; B 8, white. About midway between γ and δ.

770. 263 H. I. DRACONIS. (H. 2738.)

	h.	m.	s.			s.
R. A.	12	3	3	Prec.	+	3·03
		°	′			″
Decl.	N	69	24·9	——	S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; l E; b M;" which means:—"considerably bright; little extended; brighter in the middle."

771. 278 H. I. DRACONIS. (h. 1100; H. 2742.)

	h.	m.	s.			s.
R. A.	12	3	29	Prec.	+	3·00
		°	′			″
Decl.	N	75	30·7	——	S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; c L; R; gmb M;" which means:—"pretty bright; considerably large; round; gradually much brighter in the middle."

772. 59 B. VIRGINIS. (Σ. 1604.)

	h.	m.	s.			s.
R. A.	12	3	46	Prec.	+	3·07
		°	′			″
Decl.	S	11	14·0	——	S	20·05

		Position.	Distance.	Epoch.
		°	″	
Struve, W.	A B	93·3	11·9	1831·95
	A C	96·9	58·0	
Secchi	A B	92·8	11·7	1856·40
	A C	95·2	50·3	
Flammarion	A B	91·5	11·6	1877·40
	A C	93·1	41·9	

A triple star. A 7, white; B 9½; C 8. In AB there seems to be going on a very slow decrease of angle and distance, though Dunér doubts this. He says:—"La faiblesse de l'étoile B explique parfaitement les écarts sans qu'on ait besoin de supposer qu'un changement réel a eu lieu." The motion of C is rectilinear. Dunér calculates that the minimum distance of AC, namely 10″, will be attained in 2008 A.D. As a telescopic object this is not very interesting.

773. 196 ♅. I. CANUM VENATICORUM. (H. 2745; 𝕽.)

		h.	m.	s.			s.
R. A.		**12**	**3**	**54**	Prec.	+	3·05
		°	′				″
Decl.	**N**	**44**	**17·4**		——	S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; l E; vgb M; * np;" which means:—"bright; pretty large; little extended; very gradually brighter in the middle; there is a star on the *np* side."

774. 169 ♅. I. CANUM VENATICORUM. (h. 1105; H. 2750; 𝕽.)

		h.	m.	s.			s.
R. A.		**12**	**4**	**25**	Prec.	+	3·05
		°	′				″
Decl.	**N**	**40**	**29·4**		——	S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; v L; vglb M;" which means:—"bright; very large; very gradually less bright in the middle."

775. 19 ♅. I. COMÆ BERENICIS. (h. 1106; H. 2752; 𝕽.)

		h.	m.	s.			s.
R. A.		**12**	**4**	**27**	Prec.	+	3·06
		°	′				″
Decl.	**N**	**19**	**9·7**		——	S	20·05

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; p L; R; gb M; rrr;" which means:—"a globular cluster; very bright; pretty large; round; gradually brighter in the middle; well resolved, so as clearly to be seen to consist of stars."

776. 73 ♅. I. COMÆ BERENICIS. (h. 1110; H. 2755; ℜ.)

		h. °	m. ′	s.			s. ″
R. A.		12	4	58	Prec.	+	3·06
Decl.	N	31	0·9		——	S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; R; pgmb M;" which means:—"bright; small; round; pretty gradually much brighter in the middle."

777. 165 ♅. I. CANUM VENATICORUM. (h. 1111; H. 2756; ℜ.)

		h. °	m. ′	s.			s. ″
R. A.		12	4	58	Prec.	+	3·05
Decl.	N	40	0·5		——	S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; S; R; vsmb M B N; p of 2;" which means:—"very bright; small; round; very suddenly much brighter in the middle where there is a bright nucleus; the preceding of 2 nebulæ."

The second nebula mentioned above (=642 ♅. II.; h. 1113; H. 2760) is described as "p F; S; E; vgb M;" which means:—"pretty faint; small; extended; very gradually brighter in the middle." Both are engraved, *Phil. Trans.*, 1861, Pl. xxvii. Fig. 2.

778. 11 ♅. I. COMÆ BERENICIS. (H. 2758.)

		h. °	m. ′	s.			s. ″
R. A.		12	5	9	Prec.	+	3·06
Decl.	N	18	57·9		——	S	20·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; E; b M;" which means:—"bright; pretty large; extended; brighter in the middle."

779. 1606 Σ. CANUM VENATICORUM.

		h. °	m. ′	s.			s. ″
R. A.		12	5	14	Prec.	+	3·06
Decl.	N	40	30·0		——	S	20·05

	Position. °	Distance. ″	Epoch.
HERSCHEL, J.	348·4	0·89	1830·87
MÄDLER	349·3	1·43	1843·21
DEMBOWSKI	346·8	1·1	1856·46
DUNÉR	344·8	1·21	1869·38
JEDRZEJEWICZ	337·2	1·17	1880·48

A double star. A 6½, white; B 7½, white. The angle is certainly decreasing, and the distance may be increasing. Gledhill says:—"Probably binary."

780. 9 H. I. VIRGINIS. (h. 1126; H. 2776.)

		h.	m.	s.				s.
R. A.		12	7	15	Prec.	+		3·07
Decl.	N	1°	54′·5		——		S	20″·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p S; pm E 135° ± ; b M N;" which means:—"pretty bright; pretty small; pretty much extended in the direction of about 135° with the meridian; brighter in the middle where there is a nucleus."

781. 15 P. XII. CENTAURI.

		h.	m.	s.				s.
R. A.		12	8	17	Prec.	+		3·10
Decl.	S	45°	7′·0		——		S	20″·04

	Position.		Distance.		Epoch.
Herschel, J.	247°·2	...	4″ *est.*	...	1837·17

A double star. A 5½; B 7. "Both stars yellow; a very fine object."—(*Sir J. Herschel.*)

782. 98 M. VIRGINIS. (h. 1132; H 2786; R.) CCCCXXXV.

		h.	m.	s.				s.
R. A.		12	8	34	Prec.	+		3·06
Decl.	N	15°	30′·5		——		S	20″·04

A fine and large, but rather pale nebula, between Virgo's left wing and Leo's tail; with the bright star, 6 Comæ Berenicis, following in the next field exactly on the parallel. M., who discovered it in 1781, merely registered it as "a nebula without a star, with an extremely faint light;" but on keeping a fixed gaze it brightens up towards the centre. It is elongated, in the direction of two stars, the one *np* and the other *sf* of the object; with another star in the *nf* quadrant pretty close. It follows β Leonis by 6½° in the direction of α Boötis; it lies on the outskirts of the vast region of nebulæ that adorns the Virgin's wing.

[Engraved, Vogel, *Nebelflecken*, Pl. i. Fig. 7.]

783.

1615 Σ. COMÆ BERENICIS.

	h.	m.	s.		s.
R. A.	12	8	35	Prec. −	3·05
	°	′			″
Decl.	N 33	24·0		—— S	20·04

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	88·3	26·9	1831·90
Main	87·5	26·9	1864·30

A double star. A 6, yellowish; B 9, ashy.

784.

171 ♅. I. COMÆ BERENICIS. (h. 1140; H. 2796; 𝕽.)

	h.	m.	s.		s.
R. A.	12	9	32	Prec. +	3·04
	°	′			″
Decl.	N 33	48·5		—— S	20·04

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; S; R; psmb M;" which means:—"very bright; small; round; pretty suddenly much brighter in the middle."

785.

δ URSÆ MAJORIS. CCCCXXXVI.

	h.	m.	s.		s.
R. A.	12	9	58	Prec. +	3·00
	°	′			″
Decl.	N 57	38·6		—— S	20·04

	Position.	Distance.	Epoch.
	°	″	
Burnham	124·1	188·6	1879·30

A fine star—suspected of variability—with a distant companion, on the Greater Bear's stern-frame. A 3, pale yellow; B 9, ash-coloured, other stars in the following part of the field. This was enrolled by Ptolemy, Ulugh Beigh, Hevelius, La Caille, Bradley, and Piazzi, of the 3rd magnitude; but Tycho Brahé and the Prince of Hesse designate it of the 2nd. Flamsteed records it of 2½, Pigott of the 4th, and I have, on careful comparison, sometimes thought it too bright for a 3rd rank. It may therefore prove to be variable from the 2nd to the 4th lustre; and that at long periods.

This star, the N.E. one of the brilliant square, is Megrez of the Palmero and other Catalogues; a word abbreviated from the Arabian *Maghrez-al-dubb-al-akbar*, the root of the Great Bear's tail, since it is "à la naissance de la queue," rather than "in radice caudæ," a berth given sometimes to the neighbouring star Alioth, with its little companion, called the Fox, to the *nf.* ε Ursæ Majoris was also called *Al-hawar*, intensely bright, and *Al-jaun*, the black horse; but its most usual name, Alioth, first appears in the Alphonsine Tables. This being also the reported site of Hevelius's nebula of 1660, and Messier's No. 40, of 1764, I searched for them by *fishing*, but found only a couple of small stars lying *np* and *sf*, with gleams of others. This group, however, resolved by my telescope, may have been the one seen by those astronomers.

[M., though entering this place in his list as if he were actually dealing with a nebula entitled to be termed No. 40, admits that he could find no nebulous object in the place.]

786. 95 H. I. CANUM VENATICORUM. (h. 1146; H. 2804; ℜ.) CCCCXXXVII.

	h.	m.	s.			s.
R. A.	12	10	7	Prec.	+	3·04
		°	′			″
Decl.	N	36	56·2	——	S	20·04

A fine white nebula, between the two Hounds. It is in a very poor field, with two small stars preceding, one on each side of the parallel, and a 10th magnitude one pretty closely *sf.* On attentively gazing, especially when the equatorial clock is applied, the nebula *comes up* very fairly defined, and is of a slightly oval shape, with its elongation from *np* to *sf;* but despite of all my coaxing, I was unable to see the two remarkable nuclei, so beautifully figured by H. in *Phil. Trans.*, 1833, Pl. vii. Fig. 71. This object is one of a nebulous group located between α Canum Venaticorum and ξ Ursæ Majoris, and bearing W.S.W. from the former, distant about 8°.

787. 35 H. I. VIRGINIS. (h. 1148; H. 2806; ℜ.) CCCCXXXVIII.

	h.	m.	s.			s.
R. A.	12	10	10	Prec.	+	3·06
		°	′			″
Decl.	N	13	46·2	——	S	20·04

A long pale-white nebula, among some telescopic stars, on the upper part of Virgo's left wing; announced in the preceding verge of the field by a 9th and a 10th magnitude star, closely on each side of the parallel. It is No. 1148 of H.'s Catalogue in *Phil. Trans.*, 1833, where it is erroneously synonymed as 109 H. I.; but it is delicately figured at No. 59 of the engraved illustrations. This is a very curious object, in shape resembling a weaver's shuttle, and lying across the parallel; the upper branch is the faintest, and the centre exhibits a palpable nucleus, which in my instrument brightens at intervals, as the eye rallies. It is an outlier of the vast and wonderful nebulous region passing through

Virgo, and is one-third of the way from β Leonis to ε Virginis. [Engraved, *Phil. Trans.*, 1833, Pl. vi. Fig. 59; Vogel, *Nebelflecken*, Pl. i. Fig. 7.]

Nearly 3′ following this, and 1¼° to the N., is the nebula 99 M.

788. 2 CANUM VENATICORUM. (Σ. 1622.) CCCCXXXIX.

		h. m. s.			s.
R. A.		12 10 37	Prec.	+	3·03
Decl.	N	41° 16′·5	——	S	20″·03

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	259·0	...	12·2	...	1782·87
Smyth	259·5	...	11·3	...	1839·31
Wilson and Seabroke	260·3	...	11·5	...	1874·26

A neat double star, near Chara's mouth, and in a barren naked-eye spot, about 9° S.W. of *a*, and one-third of the distance between that star and δ Leonis. A 6, golden yellow; B 9, smalt blue. This is a very fine object, and notwithstanding the supposed connection between strong colours and motion, its fixity is fully established, for all the recorded observations are eminently coincident.

789. 209 ♅. I. URSÆ MAJORIS. (h. 1151; H. 2811; ℞.)

		h. m. s.			s.
R. A.		12 10 43	Prec.	+	3·00
Decl.	N	48° 29′·4	——	S	20″·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; pm E 134·4°; psb M;" which means:—"considerably bright; pretty large; pretty much extended in the direction of 134·4° with the meridian; pretty suddenly brighter in the middle."

790. 1625 Σ. DRACONIS.

		h. m. s.			s.
R. A.		12 11 28	Prec.	+	2·75
Decl.	N	80° 44′·0	——	S	20″·04

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	218·7	...	14·3	...	1832·24
Main	217·5	...	14·3	...	1863·73

A double star. A 7, very white; B 7½, very white. This star is sometimes considered as belonging to Camelopardus.

791. 74 H. I. COMÆ BERENICIS. (h. 1168; H. 2832; R.)

	h. m. s.		s.
R. A.	12 12 2	Prec. +	3·03
Decl.	N 30° 13′·0	—— S	20″·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"cB; pL; vlE; smbM; r;" which means:—"considerably bright; pretty large; very little extended; suddenly much brighter in the middle; resolveable."

792. 264 H. I. DRACONIS. (h. 1170; H. 2835.)

	h. m. s.		s.
R. A.	12 12 22	Prec. —	2·86
Decl.	N 71° 24′·7	—— S	20″·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"pB; S; R; pgbM;" which means:—"pretty bright; small; round; pretty gradually brighter in the middle."

793. 32 P. XII. VIRGINIS. (Σ. 1627.) CCCCXL.

	h. m. s.		s.
R. A.	12 12 30	Prec. +	3·07
Decl.	S 3° 20′·5	—— S	20″·03

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	197·0	21·0	1823·33
Smyth	198·6	20·6	1836·27
Main	196·1	19·5	1861·30
Jedrzejewicz	196·1	20·1	1878·32

A fine double star, near the centre of Virgo's right wing, 3° due S. of η Virginis, and one-third of the way from α Virginis to α Leonis. According to Piazzi they are both 7½ magnitudes, though I cannot but say that B is certainly smaller than A. They are both of a silvery white tinge.

It was under the following circumstances that my measures in 1836 were made. In September, 1835, I received a letter from M. Cacciatore, the successor of Piazzi at Palmero, of which this extract is literally translated: "One important thing I must communicate to you. In the month of May I was observing the stars that have proper motion—a labour that has employed me several years. Near the 17th star, 12th hour [not far from No. 32], of Piazzi's Catalogue, I saw another, also of the 7·8th magnitude, and noted the approximate distance between them. The weather not having permitted me to observe on the two following nights, it was not till the third night that I saw it again, when it had advanced a good deal, having gone further to the eastward and towards the equator. But clouds obliged me to trust to the following night. Then, up to the end of May, the weather was horrible; it seemed in Palermo as if winter had returned; heavy rains and impetuous winds succeeded each other, so as to leave no opportunity of attempting anything. When, at last, the weather permitted observations at the end of a fortnight, the star was already in the evening twilight, and all my attempts to recover it were fruitless: stars of that magnitude being no longer visible. Meanwhile the estimated movement, in three days, was 10″ in R.A., and about a minute, or rather less, towards the N. So slow a motion would make me suspect the situation to be beyond Uranus. I was exceedingly grieved at not being able to follow up so important an examination."

Though this notification arrived after the apparition of Virgo had passed for the season, I lost no time in advising the astronomical world of its tenour; and bestirred myself, on the reappearance of the constellation, by making reticle diagrams of all the 7½ magnitude objects which I could find hereabouts. My endeavours proved fruitless; and after much good time lost in the search, I became convinced it would not be my fortune to rediscover a planet there.

An extract from my letter being read to the Academy of Sciences at Paris, 15th February, 1836, it was printed in the *Comptes Rendus* of that *séance*, with this sensible but severe animadversion by M. Arago:

"Il y a dans cette communication une circonstance que les astronomes auront beaucoup de peine à comprendre. Lorsque le temps redevint favorable à Palerme, à la fin de Mai, l'étoile mobile n'était plus visible, dit M. Cacciatore, à cause de la lumière crépusculaire du soir. L'explication est admissible lorsqu'il s'agit du passage de l'astre au méridien; mais deux, mais trois heures après le coucher du soleil, mais à nuit-close, rien ne pouvait empêcher de comparer la planète soupçonnée aux étoiles voisines, soit avec une machine parallactique, soit, à son défaut, *avec le grand cercle azimuthal qui occupe le premier rang parmi les instruments de l'Observatoire de Palerme.* Il nous paraît inconcevable qu'un observateur du mérite de M. Cacciatore, contrarié comme il l'était, comme il devait l'être, de ne pouvoir constater de réalité une découverte aussi capitale, ne se soit pas avisé de suivre l'astre hors du méridien."

794. 89 H. I. COMÆ BERENICIS. (h. 1171; H. 2836; 𝕽.)

R. A. 12h. 12m. 33s.	Prec. + 3s.·03
Decl. N 28° 47′·3	—— S 20″·03

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; S; E; vsvmb M N;" which means:—"very bright; small; extended; very suddenly very much brighter in the middle where there is a nucleus."

795. 99 M. VIRGINIS. (h. 1173; H. 2838; 𝕽.)

R. A. 12h. 13m. 13s.	Prec. + 3s.·05
Decl. N 15° 6′·9	—— S 20″·02

One of the Earl of Rosse's "spiral" nebulæ. Sir J. Herschel gives the following summary account of it:—"!! (H. h.); B; L; R; gb M; r (L) 3-branched spiral;" which expands into "very remarkable (observed by Sir W. and Sir J. Herschel); bright; large; round; gradually brighter in the middle; resolveable (large) 3-branched spiral." Smyth says: "Though pale it is well defined in my instrument." 1° *sf* 6 Comæ Berenicis, a 5th mag. star and the next considerable star *f* β Leonis, at nearly 7°.

Engraved, *Phil. Trans.*, 1850, Pl. xxxv. Fig. 2; Lassell, *Mem. R. A.S.*, vol. xxxvi. Pl. iv. Fig. 16; Vogel, *Nebelflecken*, Pl. i. Fig. 8.

796. 43 H. V. URSÆ MAJORIS. (h. 1175; H. 2841; 𝕽.)

CCCCXLI.

R. A. 12h. 13m. 33s.	Prec. + 2s.·99
Decl. N 47° 54′·5	—— S 20″·03

A large white nebula, closely following the haunches of the Greater Bear. It is a noble-sized oval, trending rather from the vertical in a direction *np* and *sf*, with a brightish nucleus in its southern portion; the lateral edges are better defined than the ends. It is preceded by two stars of the 10th mag., and followed by two others; and there are also some minute points of light in the field, seen occasionally by glimpses.

Its place will be indicated by running a diagonal line across the square of Ursa Major, from α through γ, and carrying it 7½° into the S.E., that is, a little less than the distance between those stars.

[This object yields a continuous spectrum. Engraved, *Phil. Trans.*, 1833, Pl. vi. Fig. 55.

797. 75 ♅. I. COMÆ BERENICIS. (h. 1185; H. 2851; R.)

R. A.	12h 14m 17s	Prec.	+	3s·02
Decl.	N 30° 13′·7	——	S	20″·02

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"vB; vL; E 90° ±; mb M N;" which means:—"very bright; very large; extended in the direction of 90° or thereabouts; much brighter in the middle where there is a nucleus."

798. 90 ♅. I. COMÆ BERENICIS. (h. 1186; H. 2855; R.)

R. A.	12h 14m 33s	Prec.	+	3s·02
Decl.	N 29° 53′·6	——	S	20″·02

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; R; mb M; r; p of 2;" which means:—"very bright; pretty large; round; much brighter in the middle; resolveable; the preceding of 2 nebulæ." This is identical with 322 ♅. II.

The other nebula here mentioned (=323 ♅. II.; h. 1188; H. 2858) is described as "B; S; R; b M;" which means:—"bright; small; round; bright in the middle."

799. 20 B. CANUM VENATICORUM. (Σ. 1632.)

R. A.	12h 14m 46s	Prec.	—	3s·01
Decl.	N 38° 31′·0	——	S	20″·01

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	193·4	...	10	...	1831·38
Burnham	192·2	...	10·2	...	1878·32

A double star. A 7, yellow; B 10.

800. 275 ♅. I. DRACONIS. (h. 1192; H. 2868.)

R. A.	12h 15m 26s	Prec.	+	2s·72
Decl.	N 75° 58′·9	——	S	20″·01

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; v S; R; lb M; 3 st f;" which means:—"pretty bright; very small; round; a little brighter in the middle; 3 stars follow." Engraved, D'Arrest, *Siderum Nebulosorum*, p. 207.

801. 61 M. VIRGINIS. (h. 1202; H. 2878; ℜ.) CCCCXLII.

	h.	m.	s.		s.
R. A.	12	16	18	Prec. +	3·06
		°	′		″
Decl.	N	5	5·1	—— S	20·00

A large pale-white nebula, between the Virgin's shoulders. This is a well-defined object, but so feeble as to excite surprise that Messier detected it with his $3\frac{1}{2}^{\text{ft}}$ telescope in 1779. Under the best action of my instrument it blazes towards the middle; but in H.'s reflector it is faintly seen to be bi-central, the nuclei 90″ apart, and lying *sp* and *nf*. It is preceded by 4 telescopic stars, and followed by another. It bears about S. by W. from, and is within a degree's distance of 17 Virginis.

This object is an outlier of a vast mass of discrete but neighbouring nebulæ, the spherical forms of which are indicative of compression.

[Engraved, *Phil. Trans.*, 1833, Pl. vii. Fig. 69; and *Phil. Trans.*, 1861, Pl. xxvii. Fig. 21, where h. 1196 is a misprint for h. 1202.]

802. 76 H̤. I. COMÆ BERENICIS. (h. 1204; H. 2881; ℜ.)

	h.	m.	s.		s.
R. A.	12	16	53	Prec. +	3·02
		°	′		″
Decl.	N	30	30·2	—— S	20·00

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; E 150° ±; sb M; * n p;" which means:—"considerably bright; large; extended in the direction of about 150° with the meridian; suddenly brighter in the middle; there is a star on the *np* side."

803. 276 H̤. I. DRACONIS. (h. 1210; H. 2888.)

	h.	m.	s.		s.
R. A.	12	16	56	Prec. +	2·68
		°	′		″
Decl.	N	75	56·0	—— S	20·00

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p S; vl E; sb M;" which means:—"pretty bright; pretty small; very little extended; suddenly brighter in the middle."

804. 17 VIRGINIS. (Σ. 1636.) CCCCXLIII.

R. A. $12^{h}\ 16^{m}\ 57^{s}$	Prec. + $3^{s}{\cdot}06$
Decl. N $5^{\circ}\ 55'{\cdot}2$	—— S $20''{\cdot}00$

	Position. °	Distance. "	Epoch.
Herschel, W.	328·3	20·1	1782·10
Herschel, J., and South	339·6	20·9	1823·20
Struve, W.	336·7	19·3	1829·26
Wilson, &c.	336	20·0	1874·26
Jedrzejewicz	336·6	19·8	1878·70

A neat double star, between the Virgin's shoulders; lying at nearly one-third of the distance from β Leonis to α Virginis, and nearly N. of η Virginis. A 6, light rose tint; B 9, dusky red. From a difference between the first observations and those of H. and S., the change was suspected to be owing to the proper motions of the large star.

But I am inclined to suppose that an error of 10° in the angular position may be imputed to the original entry at Slough, as the measures of comparison would then be pretty coincident for a star of such disproportion.

805. 12 COMÆ BERENICIS. CCCCXLIV.

R. A. $12^{h}\ 16^{m}\ 59^{s}$	Prec. + $3^{s}{\cdot}03$
Decl. N $26^{\circ}\ 27'{\cdot}5$	—— S $20''{\cdot}00$

	Position. °	Distance. "	Epoch.
Herschel, W.	163·0	58·9	1783·00
Herschel, J., and South	168·8	65·9	1821·39
Smyth	168·2	66·1	1831·28

A bright star, with a distant companion, in the middle of the Tresses; about $1\frac{1}{2}^{\circ}$ S.W. of its *lucida*, and nearly mid-way between α Canum Venaticorum and β Leonis. A 5, straw-coloured yellow; B 8, rose-red; a third star of the same magnitude in the *sf* quadrant. Relative fixity is implied.

Berenice's Hair was intruded into the constellated host many ages ago, but was only confirmed between the time of the old 48 asterisms, and the gathering together of some clustered *amorphotæ* in the sixteenth century; for Ptolemy did not include it as a distinct asterism, but designates it only as πλόκαμος; and Ulugh Beigh enrols it as an *extra* of Leo, under the name of *al ḍafírah*, the tresses. Niebuhr heard it called *al-ḥuzmeh* at Cairo, the which signifies a bundle of wood or corn; but the Arabs in general termed it *al-helba*, and the Trica of the Alphonsine Tables is recognised as being from τρίχες, a head of hair. It was anciently believed that the Tresses had been snatched into the heavens, because Conon the astronomer had so asserted, in order to console the lady for the loss of a lock of her hair, which she had dedicated to Venus, on account of a victory obtained by her husband, Ptolemy Evergetes; but it was Tycho Brahé who first fixed it. Old Thomas Hill, in his *Schoole of Skil*, 1599, calls these sacred tresses by the homely designation of Berenice's Bush. It is readily found by running an imaginary line from η Ursæ Majoris, the outer horse of the wain, or tip of the Great Bear's tail, through α Canum Venaticorum, and thence to β Leonis, in the Lion's tail; midway between which two last stands this fine though diffused cluster. The numbers have successively been:

Tycho Brahé . .	14 stars.	Flamsteed . . .	43 stars.
Hevelius . . .	21 „	Bode	117 „

806. 100 M. VIRGINIS. (h. 1211; H. 2890; 𝕽.) CCCCXLV.

	h. m. s.		s.
R. A.	12 17 24	Prec. +	3·04
	° ′		″
Decl.	N 16 26·0	—— S	20·00

A round nebula, pearly white, off the upper part of the Virgin's left wing, and certainly at a great distance from Virgo's ear of corn, where Messier in the *Connaissance des Temps* placed it: indeed, the true site will be hit upon one-fifth of the way from β Leonis towards Arcturus. This is a large but pale object, of little character, though it brightens from its attenuated edges towards the centre; and is therefore proved to be globular. It was discovered by Méchain in 1781, and is accompanied by 4 small stars, at a little distance around it; besides minute points of light in the field, seen by occasional gleams.

We are now in the broad grand stratum of nebulæ, which lies in a direction almost perpendicular to the Galaxy, and passes from the S., through Virgo, Berenice's Hair, Canes Venatici, and the Great Bear, to the Pole, and beyond. This glorious but most mysterious zone of diffused spots, is an indisputable memorial to all future times, of the unwearied industry and indomitable scientific energy of Sir W. Herschel. Yet has this unrivalled contributor to knowledge been disparagingly described, as a man indulging in "speculations of no great value to astronomy, rather than engage in computations by which the science can really be benefited." Save the mark! This is said of a philosopher of zeal and application hitherto unequalled: one whose contributions to the *Philosophical Transactions* prove the bold but circumspect grandeur of his conceptions, his consummate mechanical resources, and the exactness of his elaborate calculations. Herschel's labours, however, transcended those of the age in which he was cast, although he gave such animation and bias to sidereal astronomy that his mantle was caught at.

[Engraved, Lassell, *Mem. R.A.S.* vol. xxxvi. Pl. iii. Fig. 17.]

807. 292 Dunlop CRUCIS. (h. 3389; H. 2912.)

	h. m. s.		s.
R. A.	**12 18 27**	Prec. +	3·26
	° ′		″
Decl.	**S 61 17·2**	—— S	19·99

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v B; v L; l C; st 12 . . . 14;" which means:—"a cluster; very bright; very large; little condensed; the component stars vary from the 12th to the 14th magnitudes."

808. 123 ♅. I. VIRGINIS. (h. 1228. H. 2915; 𝕽.)

	h. m. s.		s.
R. A.	**12 18 40**	Prec. +	3·06
	° ′		″
Decl.	**N 5 32·5**	—— S	19·99

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; * 8·9 sf 3′;" which means:—"bright; small; there is a star of mag. 8½ in the *sf* quadrant, at a distance of 3′." Dreyer states that the true R.A. is 1m greater than that here given.

809. 65 ♅. I. COMÆ BERENICIS. (h. 1231; H. 2917; 𝕽.)

	h. m. s.		s.
R. A.	**12 18 50**	Prec. +	3·11
	° ′		″
Decl.	**S 18 10·0**	—— S	19·99

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; R; vsmb M n; r;" which means:—"very bright; large; round; very suddenly much brighter in the middle to the north [? n an error for N = nucleus]; barely resolveable."

810. 30 ♅. I. VIRGINIS. (h. 1232; H. 2921; 𝕽.)

	h. m. s.		s.
R. A.	**12 18 52**	Prec. +	3·06
	° ′		″
Decl.	**N 7 55·7**	—— S	19·92

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"c B; p L; vl E; gl [should be "b"] smb M;" which means:—"considerably bright; pretty large; very little extended; at first gradually brighter, then suddenly much brighter in the middle."

811. 166 H. I. CANUM VENATICORUM. (h. 1234; H. 2924.)

		h.	m.	s.			s.
R. A.		12	19	9	Prec.	+	2·98
		°	′				″
Decl.	N	39	58·9		——	S	19·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; S; R; mb M N; r;" which means:—"considerably bright; small; round; much brighter in the middle where it exhibits a nucleus."

812. 22 H. I. VIRGINIS. (h. 1235; H. 2925.)

		h.	m.	s.			s.
R. A.		12	19	17	Prec.	+	3·05
		°	′				″
Decl.	N	12	18·4		——	S	19·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p s; R; gb M;" which means:—"bright; pretty small; round; gradually brighter in the middle."

813. 84 M. VIRGINIS. (h. 1237; H. 2930; R.)

		h.	m.	s.			s.
R. A.		12	19	29	Prec.	+	3·04
		°	′				″
Decl.	N	13	29·9		——	S	19·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; R; psb M; r;" which means:—"very bright; pretty large; round; pretty suddenly brighter in the middle; scarcely resolveable."

814. 12 H. I. COMÆ BERENICIS. (h. 1239; H. 2942; R.)

		h.	m.	s.			s.
R. A.		12	19	38	Prec.	+	3·04
		°	′				″
Decl.	N	15	22·3		——	S	19·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; R; smb M;" which means:—"bright; small; round; suddenly much brighter in the middle."

815. 85 M. COMÆ BERENICIS. (h. 1242; H. 2946; 𝕽.)

		h.	m.	s.			s.
R. A.		12	19	49	Prec.	+	3·03
		°	′				″
Decl.	N	18	47·9		——	S	19·98

A bright and rather large nebula brightening in the middle. 11 Comæ Berenicis, a star of mag. 5, precedes, a little to the S.

816. 277 H. I. DRACONIS. (h. 1247; H. 2948.)

		h.	m.	s.			s.
R. A.		12	19	55	Prec.	+	2·61
		°	′				″
Decl.	N	76	8·0		——	S	19·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; c L; l C; psmb M;" which means:—"bright; considerably large; little compressed; pretty suddenly much brighter in the middle."

817. α CRUCIS.

		h.	m.	s.			s.
R. A.		12	20	28	Prec.	+	3·27
		°	′				″
Decl.	S	62	29·3		——	S	19·98

		Position.	Distance.	Epoch.
		°	″	
Herschel, J.	A B	120·6	5·6	1835·83
	A C	201·5	90·7	1836·59
	A D	147	60 *est.*	1834·22
	A E	119	100 *est.*	
	A F	105	125 *est.*	

A *Nautical Almanac* star. A 1½; B 2; C 5; D 13; E 14; F 13.

818. 86 M. VIRGINIS. (h. 1253; H. 2961; 𝕽.)

		h.	m.	s.			s.
R. A.		12	20	31	Prec.	+	3·04
		°	′				″
Decl.	N	13	32·9		——	S	19·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; R; gb M N; r;" which means:—"very bright; large; round; gradually brighter in the middle where it exhibits a nucleus; scarcely resolveable."

819. 77 H. I. COMÆ BERENICIS. (h. 1258; H. 2972; R.)

		h.	m.	s.		s.
R. A.		12	20	58	Prec. +	2·99
		°	′			″
Decl.	N	31	49·7		—— S	19·97

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; E; g, vsmb M *;" which means:—"very bright; large; extended; at first gradually, then very suddenly brighter in the middle where there is a star." The Decl. is as corrected by Dreyer.

820. 28a H. I. VIRGINIS. (h. 1274; H. 2991.)

		h.	m.	s.		s.
R. A.		12	22	5	Prec. +	3·04
		°	′			″
Decl.	N	13	40·8		—— S	19·96

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; c L; R; p of 2;" which means:—"very bright; considerably large; round; the preceding of 2 nebulæ."

The second object (=28 b H. I.; h. 1275; H. 2994) is mentioned as "B; c L; vl E; r;" which means:—"bright; considerably large; very little extended; scarcely resolveable."

821. 91 H. I. COMÆ BERENICIS. (h. 1280; H. 3001; R.)

		h.	m.	s.		s.
R. A.		12	22	45	Prec. +	3·00
		°	′			″
Decl.	N	29	13·5		—— S	19·96

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; E 90°; sb M;" which means:—"bright; large; elongated in the direction of 90° with the meridian; suddenly brighter in the middle."

822. 213 H. I. CANUM VENATICORUM. (h. 1281; H. 3002; R.)

		h.	m.	s.		s.
R. A.		12	22	45	Prec. +	2·94
		°	′			″
Decl.	N	44	41·9		—— S	19·96

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; c L; m E 15°; rrr; * 9, 5′;" which means:—"very bright; considerably large; much extended in the direction of 15° with the meridian; well resolved,—clearly seen to consist of stars; there is a 9th mag. star at a distance of 5′."

823. 17 COMÆ BERENICIS. (Σ. 21 App. I.)

	h. m. s.		s.
R. A.	12 23 25	Prec. +	3·00
	° ′		″
Decl. N	26 30·4	—— S	19·95

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	250·6 ...	145·3 ...	1836·43
JEDRZEJEWICZ	250·4 ...	145·4 ...	1877·77

A 4½, white; B 6, bluish white. B is 96 P. XII. Webb remarks that "the smaller star, by averted vision, seems more surrounded than the other with scattered light."

824. 161 H. I. VIRGINIS. (h. 1288; H. 3012.)

	h. m. s.		s.
R. A.	12 23 25	Prec. +	3·04
	° ′		″
Decl. N	14 35·1	—— S	19·95

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p L; i R; b M; r; * 8 sf 2′;" which means:—"pretty bright; pretty large; irregularly round; brighter in the middle; scarcely resolveable; there is an 8th mag. star in the *sf* quadrant at a distance of 2′."

825. 49 M. VIRGINIS. (h. 1294; H. 3021; R.) CCCCXLVII.

	h. m. s.		s.
R. A.	12 24 8	Prec. +	3·05
	° ′		″
Decl. N	8 36·3	—— S	19·94

A bright, round, and well-defined nebula, on the Virgin's left shoulder; exactly on the line between δ Virginis and β Leonis, 8°, or less than half-way, from the former star. With an eyepiece magnifying 93 times, there are only two telescopic stars in the field, one of which is in the *sp* and the other in the *sf* quadrant; and the nebula has a very pearly aspect. This object was discovered by Oriani in 1771, and registered by Messier as a "faint nebula, not seen without difficulty," with a telescope 3½ft in length. It is a pity that this active and assiduous astronomer could not have been furnished with one of the giant telescopes of the present day. Had he possessed efficient means, his useful and, in its day, unique Catalogue, for which sidereal astronomy must ever remain indebted to him, would no doubt have been greatly augmented.

["Inconsiderable, but beautifully situated between two 6th mag. stars. Bright open pair. S."—*Webb.*]

826. δ CORVI. CCCCXLVI.

	h. m. s.		s.
R. A.	12 24 11	Prec. +	3·10
	° ′		″
Decl.	S 15 54·1	—— S	19·94

	Position.	Distance.	Epoch.
	°	″	
Herschel, W	216·0 ...	23·5 ...	1782·87
Herschel, J., and South	213·5 ...	24·0 ...	1823·29
Smyth	210·9 ...	23·5 ...	1831·34
Main	213·6 ...	22·9 ...	1862·31

A fine double star, on the Raven's right wing. A 3, pale yellow; B 8½, purple. This object was thus noticed by Piazzi, No. 101, Hora XII.: "Duplex. Socia summe exigua 0·5″ temporis præcedit, parumper ad austrum." Discordant as the angle of position seems to be, I am more inclined to attribute the differences to instrumental and accidental oversights, than to orbital movement; moreover, there is a minus quantity of proper motion imputed to the large star by Piazzi, and the observations at so low an altitude are teased with variable refraction.

The Palermo and other Catalogues have dubbed this star Algorab, from the Arabian *Al-ghoráb*, the raven, though the star is less brilliant than β. Wherefore α, which is usually the brightest star in an asterism, has here less brilliance than β, γ, or δ, and is recorded as *Minḳár-al-ghoráb*, the raven's beak; and it is also called *Al-khibá*, the tent, a name given by some of the Arabs to Corvus. In the Alphonsine Tables the name Algorab is applied to γ.

The alignment of Algorab is easy. To the W.S.W. of α Virginis two stars of the 3rd magnitude, and 3° apart, will be seen prolonging the line. These are δ and γ Corvi; δ, the nearest to α Virginis, is 15° from it, and it forms with that star and γ Virginis an exact equilateral triangle.

827. γ CRUCIS.

	h. m. s.		s.
R. A.	12 25 3	Prec. +	3·26
	° ′		″
Decl.	S 56 29·6	—— S	19·93

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	38·0 ...	120 *est.* ...	1834·26

A conspicuous star of mag. 2, with a distant companion of mag. 5. "The colour of γ Crucis is a clear orange-yellow. Its magnitude has been variously estimated from 1·8 to 2·4 even by the same observer, and it is probable that the brightness of the star really changes by a considerable amount."—(*Gould.*)

828. 197 and 198 H. I. CANUM VENATICORUM.
(h. 1306, 1308; H. 3041, 3042; R.)

	h.	m.	s.			s.
R. A.	12	25	10	Prec.	+	2·94
		°	′			″
Decl.	N	42	18·6	——	S	19·93

A pair of nebulæ. The preceding one is thus described in Sir J. Herschel's *General Catalogue* of 1864:—"B; p S; i R;" and the following one:—"v B; v L; m E 130°; rr;" which phrases mean respectively:—"bright; pretty small; irregularly round;" and "very bright; very large; much extended in the direction of 130° with the meridian; partially resolved,—some stars visible." The place given above is D'Arrest's of the preceding nebula: the other follows at a distance of 6s, and lies 3′ 12″ to the S. The pair are engraved, *Phil. Trans.*, 1861, Pl. xxvii. Fig. 23.

829. 87 M. VIRGINIS. (h. 1301; H. 3035; R.)

	h.	m.	s.			s.
R. A.	12	25	15	Prec.	+	3·04
		°	′			″
Decl.	N	12	59·4	——	S	19·93

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; R; mb M;" which means:—"very bright; very large; round; much brighter in the middle."

830. 83 H. I. COMÆ BERENICIS. (h. 1307; H. 3043; R.)

	h.	m.	s.			s.
R. A.	12	25	54	Prec.	+	3·00
		°	′			″
Decl.	N	26	23·1	——	S	19·93

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; R; vsmb M N;" which means:—"very bright; pretty large; round; very suddenly much brighter in the middle where there is a nucleus." Sir J. Herschel sets against this object the note, "Not found by Lord Rosse when once looked for," yet in the Rosse Catalogue of 1880 it is given as seen on April 3, 1861, and is marked "v B; R; fades off gradually."

831. 88 M. VIRGINIS. (h 1312; H. 3049; R.) CCCCXLVIII.

	h.	m.	s.			s.
R A.	12	26	26	Prec.	+	3·03
		°	′			″
Decl.	N	15	1·9	——	S	19·92

A long elliptical nebula, on the outer side of Virgo's left wing. It is pale-white, and trends in a line bearing *np* and *sf;* and with its attendant stars, forms a pretty pageant. The lower or N. part in the inverted field is brighter than the S., a circumstance which, with its spindle figure, opens a large field for conjecture.

This is a wonderfully nebulous region, and the diffused matter occupies an extensive space, in which several of the finest objects of Messier and the Herschels will readily be picked up by the keen observer in extraordinary proximity. The following diagram exhibits the local disposition of the immediate nebulous neighbours N. of 88 Messier; they being preceded by M. 84, and followed by M. 58, 89, 90, and 91, in the same zone; thus describing a spot only 2½° from N. to S., and 3° from E. to W., as the micrometer shows it. And it will be convenient

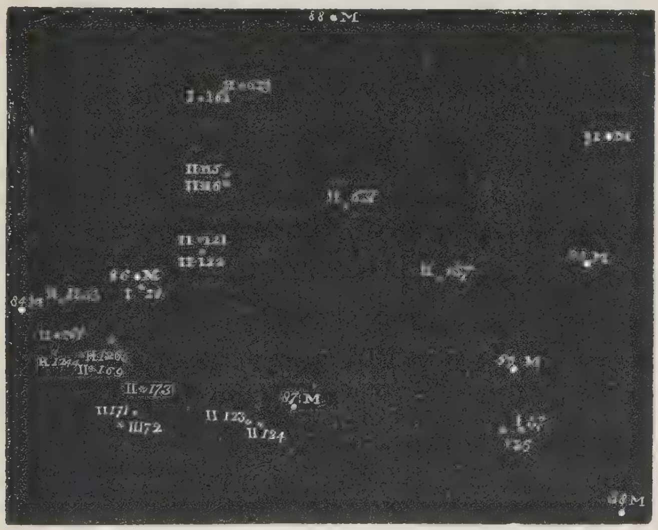

Fig. 21. Group of Nebulæ in Virgo.

to keep in mind, that the situation of the extraordinary conglomerate of nebulæ and compressed spherical clusters which crowd the Virgin's left wing and shoulder is pretty well pointed out to the practised naked eye by ε, δ, γ, η, and β Virginis forming a semicircle to the E., whilst due N. of the last-mentioned star, β Leonis marks the N.W. boundary. Reasoning upon the Herschelian principle, this may reverently be assumed as the thinnest or shallowest part of our firmament, and the vast laboratory of the segregating mechanism by which compression and insulation are ripened in the course of unfathomable ages. The theme, however imaginative, is solemn and sublime.

[Engraved, Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. iv. Fig. 20; Vogel, *Nebelflecken*, 1876, Pl. i. Fig. 9.]

832. 31 H. I. VIRGINIS. (h. 1329; H. 3075.)

	h. m. s.		s.
R.A.	12 28 28	Prec. +	3·05
	° ′		″
Decl.	N 8 18·1	—— S	19·90

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; m E 120° ±; psmb M; L * f; * 9 p;" which means:—"very bright; very large; much extended in the direction of about 120° with the meridian; pretty suddenly much brighter in the middle; a large star follows; a star of mag. 9 precedes."

833. 8 CANUM VENATICORUM. (h. 1332; H. 3079; R.) CCCCL.

	h. m. s.		s.
R.A.	12 28 34	Prec. +	2·92
	° ′		″
Decl.	N 42 57·1	—— S	19·90

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	220·5	...	276·2	...	1879·26

A bright star with a distant companion, in the eye of Chara, the southern dog. A 4½, but suspected of variability, pale yellow; B 10, bluish; and there is another star in the *sp*, nearly on the parallel, at Δ R.A. 28·5ˢ, as well as a very minute one in the *nf* quadrant. The large star is involved in a nebulous photosphere, as described by H. (*Phil. Trans.*, 1833, No. 1332); but the nebulosity is no further apparent in my instrument than in giving the object an apparent derangement of focal definition.

[Dreyer says:—"Is probably to be struck out. Not seen as a nebulous star *by anybody* except h., who seems to have had some doubts on the subject." The Rosse observations also pronounce against the idea of nebulosity, and therefore Smyth's "apparent derangement" seems true in another sense from that in which he used it.]

834. β CORVI. CCCXLIX.

	h. m. s.		s.
R.A.	12 28 36	Prec. +	3·14
	° ′		″
Decl.	S 22 47·3	—— S	19·92

		Position.		Difference of R.A.		Epoch.
		°		s.		
SMYTH	A B	119	...	27·4	...	1831·34
	A C	306	...	28·0		
BURNHAM	A B	129·7	...	*not stated*	...	1879·25
	A C	292·0	...	*not stated*		

A *Nautical Almanac* star of the second grade, elected in 1830. It is in the Raven's right claw, and lies nearly midway between the two distant companions, whose position and distance are here estimated. A 2½, ruddy yellow; B 7, greenish yellow; C 8, dull grey. This is a fine star, and has unquestionably the precedence of lustre in Corvus, which could hardly have been the case in Bayer's time; and what is singular, it has no trivial Arabian designation. Ptolemy gave γ, or third degree of brightness, to α, β, γ, δ, and ε; but Tycho and Hevelius both rated α and ε of the 4th magnitude, and β has latterly been elevated to 2·3. Such discrepancies should be closely watched, for though the low altitude of the asterism may be against precision in this country, it must be recollected that Ptolemy, Ulugh Beigh, Alphonsus, and Piazzi had a smaller South Polar Distance. The comparative lustre of the stars in Corvus, in the year 1796, was ably tabulated by ♅., in *Phil. Trans.*, vol. lxxxvi. p. 468. [Webb in various years found the order of brightness to be γ δ β α. The question of the brightness of the bright stars in Corvus was examined in detail by Argelander in the *Bonn Obs.*, vol. vii., and more recently by Gould in the *Uranometria Argentina*, p. 314 *et seq.* The discordances in the records are such as to render the variability of some of the stars certain.]

Κόραξ, Corvus, is one of the constellated groups of the southern hemisphere, and though poor, is one of the ancient 48 asterisms. It is immediately to the E. of Crater, and between α Virginis and α Hydræ, but considerably nearer to the former, where it is readily made out by a lozenge of four stars of the 3rd and 4th magnitudes. As it contains a part of the body of Hydra, on which the bird rests, it is sometimes designated *Hydra et Corvus.* It was piously regarded as Noah's raven; but this not being quite satisfactory to the Mosaicists, *Columba Noachi* was instituted by Royer, in 1679. (See α Hydræ.) The constituent members of Corvus have been thus numbered:

Ptolemy	7 stars.	Hevelius	10 stars.
Tycho Brahé . .	8 „	Flamsteed . . .	9 „
Kepler	7 „	Bode	61 „

A long occult line from α Lyræ through α Virginis, and carried about 15° beyond, enters among the 4 principal and well-known stars of Corvus:

> Mark in the space along the sky, where Hydra's volumes are,
> And 'twixt the Cup and Virgin's spike, you'll find the Raven's square.

835. 24 COMÆ BERENICIS. (Σ. 1657.) CCCCLI.

R. A.	**12 29 36** ($^{h.}$ $^{m.}$ $^{s.}$)	Prec. + 3^{s}·01
Decl.	**N 18 58·9** ($^{\circ}$ $'$)	—— S $19''$·89

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	273·5	...	18·4	...	1781·16
SMYTH	272·1	...	20·5	...	1836·38
DUNÉR	271·1	...	20·3	...	1869·41
JEDRZEJEWICZ	271·0	...	20·0	...	1877·35

A neat double star, between the Tresses and Virgo's left wing; lying at two-fifths of the distance from Arcturus to Regulus. A 5½, orange colour; B 7, emerald tint,—the colours very brilliant.

836. 160 H. I. VIRGINIS. (h. 1339; H. 3092; R.)

R. A.	12ʰ 29ᵐ 50ˢ	Prec. +	3ˢ·08
Decl.	S 3° 11′·0	—— S	19″·89

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; c L; pm E 63° ±; vsmb M N;" which means:—"very bright; considerably large; pretty much elongated in the direction of about 63° with the meridian; very suddenly much brighter in the middle where it exhibits a nucleus."

837. 36 H. I. VIRGINIS. (h. 1343; H. 3095; R.)

R. A.	12ʰ 29ᵐ 54ˢ	Prec. +	3ˢ·03
Decl.	N 12° 49′·3	—— S	19″·89

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; S; v l E;" which means:—"pretty bright; small; very little extended."

There follows this at a distance of 8ˢ and 2′ 8″ to the N. another nebula (=37 H. I; h. 1349; H. 3096), which is thus described:—"p B; S; b M;" that is to say:—"pretty bright; small; brighter in the middle."

838. 89 M. VIRGINIS. (h. 1348; H. 3097.)

R. A.	12ʰ 30ᵐ 6ˢ	Prec. +	3ˢ·03
Decl.	N 13° 9′·5	—— S	19″·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p S; R; gmb M;" which means:—"pretty bright; pretty small; round; gradually much brighter in the middle."

839. 92 H. I. COMÆ BERENICIS. (h. 1352; H. 3101; R.)

R. A.	12ʰ 30ᵐ 29ˢ	Prec. +	2ˢ·98
Decl.	N 28° 33′·9	—— S	19″·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"v B; v L; m E 150°; gb M; 3 st f;" which means:—"very bright; very large; much extended in the direction of 150° with the meridian; gradually brighter in the middle; there are 3 stars following the nebula."

Engraved, *Phil. Trans.*, 1833, Pl. viii. Fig. 83.

840. 24 Ħ. V. COMÆ BERENICIS. (h. 1357; H. 3106; ℜ.) CCCCLII.

		h. / °	m. / ′	s.			s. / ″
R. A.		**12**	**30**	**50**	Prec.	+	2·99
Decl.	**N**	**26**	**35·7**		——	S	19·87

A large white nebula, in the centre of the Tresses, and 2° S.E. of the *lucida*, or 16 Comæ Berenicis. It is a curious, long, and streaky object, lying *np* and *sf* across the field, in somewhat of a weaver's shuttle shape, and preceded by four telescopic stars in a vertical curve. From the description which I received *vivâ voce* from H., my attention was intently fixed upon this nebula; and, after long and patient gazing, a parallel patch on the following limb was rather inferred than made out, by a peculiar glow on that part.

The parallel appendage to this nebula is a most extraordinary phenomenon, and is very beautifully figured in the *Phil. Trans.*, 1833, by H.; who considers the two as constituting a flat annulus seen at a great obliquity, but having very unequal breadths and densities in its two opposite semicircles. "Or," asks he, "must we admit the appendage to be a separate and distant nebula, dependant, by some unknown physical relation, on its brighter neighbour?"

[Engraved, *Phil. Trans.*, 1833, Pl. iv. Fig. 37; Lassell, *Mem. R. A. S.*, vol. xxxvi. Pl. v. Fig. 21.]

841. 32 Ħ. I. VIRGINIS. (h. 1361; H. 3110.)

		h. / °	m. / ′	s.			s. / ″
R. A.		**12**	**31**	**17**	Prec.	+	3·05
Decl.	**N**	**7**	**51·0**		——	S	19·87

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p S; m E 0° ±; sb M r N;" which means:—"considerably bright; pretty small; much extended in the direction of the meridian or thereabouts; suddenly brighter in the middle where there is a mottled nucleus, hardly resolveable."

842. 90 M. VIRGINIS. (H. 3111; 𝕽.)

	h.	m.	s.			s.
R. A.	12	31	24	Prec.	+	3·03
		°	′			″
Decl.	N	13	45·8	——	S	19·87

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p L; b M N;" which means:—"pretty large; brighter in the middle where it exhibits a nucleus."

843. 58 M. VIRGINIS. (h. 1368; H. 3121; 𝕽.)

	h.	m.	s.			s.
R. A.	12	32	8	Prec.	+	3·03
		°	′			″
Decl.	N	12	25·2	——	S	19·86

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; i R; vmb M; r;" which means:—"bright; large; irregularly round; very much brighter in the middle; hardly resolveable—rather, mottled as if with stars."

844. 143 P. XII. VIRGINIS. CCCCLIII.

	h.	m.	s.			s.
R. A.	12	33	4	Prec.	+	3·08
		°	′			″
Decl.	S	3	46·0	——	S	19·84

	Position.	Distance.	Epoch.
	°	″	
SOUTH	105·4 ...	50·5 ...	1825·36
SMYTH	104·5 ...	50·0 ...	1833·31

A wide double star, on the centre of Virgo's right wing; on the line and exactly two-thirds of the distance between Spica and η Virginis. A 6½, pale yellow; B [10], greenish; several small stars in the field.

845. 68 M. HYDRÆ. (h. 3404; H. 3128.) CCCCLIV.

	h.	m.	s.			s.
R. A.	12	33	34	Prec.	+	3·16
		°	′			″
Decl.	S	26	7·6	——	S	19·84

A large round nebula on Hydra's body, under Corvus, discovered in 1780 by Méchain. In 1786, Sir W. Herschel's 20^{ft} reflector resolved it into a rich cluster of small stars, so compressed that most of the components are blended together. It is about 3′ broad, and 4′ long;

and he estimated that its profundity may be of the 344th order. It is nearly mid-way between two small stars, one in the *np* and the other in the *sf* quadrant, a line between which would bisect the nebula. It is very pale, but so mottled that a patient scrutiny leads to the inference that it has assumed a spherical figure in obedience to attractive forces. It bears S. by E. from and is within 3° distance of β Corvi.

846. 43 Ħ. I. VIRGINIS. (h. 1376; H. 3132.) CCCCLV.

	h.	m.	s.			s.
R. A.	12	34	15	Prec.	+	3·10
Decl.	S	11°	0′·2	——	S	19″·83

A lucid white elliptical nebula, between the Virgin's right elbow and the Raven, in an elegant field of small stars. It lies nearly parallel to the equatorial line of the instrument, and on intense attention may be seen to blaze in the middle. The half dozen principal stars form a great Y, with the nebula as the centre. But it seems a mere wisp of subdued light, insomuch that my telescope does not afford me even the doubts inspired by the 20ft reflector; for Herschel remarks that there is a faint, diffused oval light all about it, and that he is almost positive that there is a dark interval or stratum, separating the nucleus and the general mass of the nebula from the light above it. "Surely no illusion."

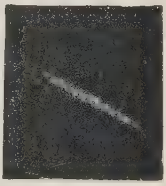

Fig. 22.
43 Ħ. I. Virginis.

"The general form of elongated nebulæ is elliptic," says H., "and their condensation towards the centre is almost invariably such as would arise from the superposition of luminous elliptic strata, increasing in density towards the centre." This must be another of those vast flat rings seen very obliquely, already spoken of, and is an elegant example of that celestial perspective; it bears due W. from α Virginis, and is 11° from that star, forming nearly a right angle with β Hydræ, which lies 12° to the S.

["Beautiful low-power field."—*Webb.* Engraved, *Phil. Trans.*, 1833, Pl. vi. Fig. 50; Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. v. Fig. 22.]

847. 21 Ħ. I. VIRGINIS. (h. 1378; H. 3134; 𝕽.)

	h.	m.	s.			s.
R. A.	12	34	22	Prec.	+	3·03
Decl.	N	10°	47′·2	——	S	19″·83

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"B; p S; R; gmb M; r; 3 st f;" which means:—"bright; pretty small; round; gradually much brighter in the middle; hardly resolveable; there are 3 stars following the nebula."

848. 254 H. I. URSÆ MAJORIS. (h. 1381; H. 3142.)

		h.	m.	s.			s.
R. A.		12	35	3	Prec.	+	2·69
			°	′			″
Decl.	N		62	13·3	——	S	19·82

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; vm E 118·6°; glb M;" which means:—"bright; large; very much extended in the direction of 118·6°; gradually less bright towards the middle."

849. γ CENTAURI. (*h. 4539.)

		h.	m.	s.			s.
R. A.		12	35	28	Prec.	+	3·28
			°	′			″
Decl.	S		48	21·5	——	S	19·81

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	354·3	...	0·75	...	1835·89

A double star. A 4; B 4.

850. 58 B. CORVI. (Σ. 1669.)

		h.	m.	s.			s.
R. A.		12	35	33	Prec.	+	3·11
			°	′			″
Decl.	S		12	24·8	——	S	19·81

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	298·9	...	5·4	...	1828·66
SMYTH	298·9	...	5·4	...	1835·50
SECCHI	302·4	...	5·7	...	1856·53
MAIN	301·5	...	5·9	...	1863·30
STONE, O.	304·4	...	5·7	...	1879·19

A double star. A 7, yellowish white; B 7, yellowish white. Smyth's measures as above are taken from Gledhill, but I have not found any such measures in his books or in any of the papers which have come into my possession.

851. γ VIRGINIS (Σ. 1670.) CCCCLVI.

R. A.	$12^{h.}\ 36^{m.}\ 5^{s.}$	Prec.	$+\ 3^{s.}{\cdot}07$
Decl.	S $0^{\circ}\ 50'{\cdot}8$	——	S $19''{\cdot}81$

	Position.	Distance.	Epoch.
Herschel, W.	130°·7	5″·70	1780·06
Herschel, J., and South	103·4	3·79	1822·25
Struve, W.	98·3	2·28	1825·42
Smyth	74·9	1·6	1831·38
	48·8	1·0	1834·20
	15·0	0·5	1835·40
	round	*round*	1836·15
	348·6	*elongated*	1836·39
Dawes	205·7	1·24	1840·38
Struve, O.	175·2	2·73	1850·39
Knott	169·2	4·05	1860·44
Dembowski	162·6	4·61	1870·25
Jedrzejewicz	157·9	5·24	1880·45

A fine binary star, in Virgo's right side. A 4, silvery white [or yellow]; B 4, pale yellow, but though marked by Piazzi of equal magnitude with A, it has certainly less brilliance; and the colours are not always of the same intensity, but whether owing to atmospherical or other causes, remains undecided. They are followed by a minute star nearly on the parallel, [of which Burnham gives:—Pos. 88·0°; Dist. 102·8″; Epoch, 1880·27.] This most instructive star bears N.W. of α Virginis, and is 15° distant, in the direction between α and γ Leonis. A very sensible proper motion has been detected in A, and there can be no doubt of B standing on in the same course.

It was with much gratification that I watched this very interesting physical object through a considerable portion of its superb ellipse. It is rather singular that, brilliant as these two stars are, various occultations of γ Virginis by the Moon have been recorded without allusion to its being double. So lately as the 20th March, 1780, the phenomenon was watched by nine astronomers; yet at Paris only, on that occasion, is mention made of one star being occulted 10^{s} before the other. On the 21st January, 1794, the occultation was observed by four astronomers; yet no one mentions duplicity. This is passing strange, because Cassini had, in 1720, perceived and recorded the two stars, noting that the western disappeared 30″ before the other, behind the Moon's dark limb, but they emerged nearly together. He could not divide them with a telescope of 11^{ft}, but with one of 16^{ft} they were well severed, and of equal magnitudes. He watched the immersion, which was oblique, with great care, hoping by refraction or discoloration to detect a lunar atmosphere; but though the circumstances were favourable, he perceived no symptom. Yet the observation was held to be of importance, for, by enlisting that able astronomer and Bradley, Sir J. Herschel considered that he gained some useful points in the orbital departure.

As the rigorous observations and computations of this object must be deemed a sort of *experimentum crucis* of the sidereal connected systems, I may be excused for entering into rather fuller details of the detection and establishment of so wonderful an elliptic motion, than I have yet indulged in among the binaries; and it will thereby serve as an example of the method of procedure with those interesting objects.

The various observations were most ably and zealously discussed by Sir John, and treated in a straightforward, geometrical mode, so as to be widely available; as will be seen on consulting the *Memoirs of the Royal Astronomical Society*, vol. v. The method is equally novel and ingenious. Assuming that the motions of binary stars are governed by the universal law of gravitation, and that they describe conic sections about their common centre of gravity and about each other, he was bent on relieving their discussion from the analytical difficulties attending a rigorous solution of equations, where the data are uncertain, irregular, and embarrassing. Measures of position were to be the sheet-anchor; for distances, with the exception of the major semi-axis, were peremptorily excluded from any share of consideration in the investigation, because of their notorious looseness and insecurity.

> "The process (said he) by which I propose to accomplish this, is one essentially graphical; by which term I understand, not a mere substitution of geometrical construction and measurement for numerical calculation, but one which has for its object to perform that which no system of calculation can possibly do, by bringing in the aid of the eye and hand to guide the judgment, in a case where judgment only, and not calculation, can be of any avail."

Under the assumption, therefore, that gravitation governs, and that one of the components revolves, while the other, though not necessarily in the focus, is at rest, the curve is constructed by means of the angles of position and the corresponding times of observation; and tangents to this curve, at stated intervals, yield the apparent distances at each angle, they being, by the known laws of elliptical motion, equal to the square roots of the apparent angular velocities.

Thus armed, Sir John proceeded with the orbit of γ Virginis. From the above positions and epochs, with interpolated intermediates, a set of polar co-ordinates were derived, and thence elliptical elements for the apparent ellipse.

The next process was to obtain the elements of the *real* ellipse, and the whole consequent investigation is so succinctly described in the paper alluded to, that any zealous tyro may tread in the same steps, with a little attention. The results, together with a comparison of the elements and observations up to the period of the computation, and an ephemeris of the system for the years 1832, 1833, 1834, and 1835, were inserted in the Supplement to the *Nautical Almanac* for 1832. But finding a discrepancy between the measures then obtained and the places predicted, Herschel, nothing daunted, again took the field, and recalculated the orbit, as described in *Memoirs R. A. S.*, vol. vi.

In giving his remarkable results to the astronomical world, Sir John said :—

> "If they be correct, the latter end of the year 1833, or the beginning of the year 1834, will witness one of the most striking phenomena which sidereal astronomy has yet afforded, viz., the perihelion passage of one star round another, with the immense angular velocity of between 60° and 70° per annum, that is to say, of a degree in 5 days. As the 2 stars will then, however, be within little more than half a second of each other, and as they are both large, and nearly equal, none but the very finest telescopes will have any chance of showing this magnificent phenomenon. The prospect, however, of witnessing a visible and measurable change, in the state of an object so remote, in a time so short (for, in the mean of a very great number of careful measures with equal stars, a degree can hardly escape observation), may reasonably be expected to call into action the most powerful instrumental means which can be brought to bear on it."

And this was Sir John's projected ellipse:

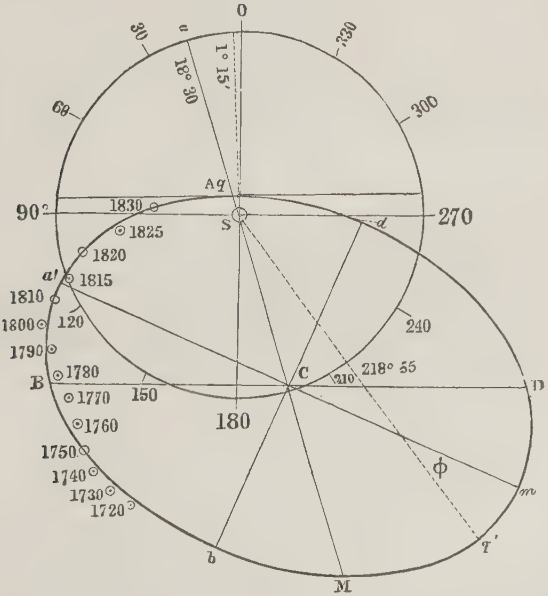

FIG. 23. ORBIT OF γ VIRGINIS AS FOUND BY SIR J. HERSCHEL IN 1832.

From the extreme delicacy of so novel a case, all the conditions were not yet met, so that this bold prediction was not circumstantially verified, although it was admirably correct in substance. Whilst rushing towards the nearest point of contact, or shortest distance of the revolving star from its primary, and the proximity became extreme, the field was left, as far as I know, to Sir John Herschel at the Cape of Good Hope, Professor Struve at Dorpat, and myself at Bedford. Our measures afforded unquestionable proofs of the wonderful movement under discussion; yet they certainly exhibited greater discrepancies than might have been expected, from the excellence of the instruments employed. But the increased angular velocity which so excentric a star acquired, when gaining its periastre, and the closeness of its junction, rendered the operations extremely difficult: added to which, the brightness of two such stars was sufficient to call forth that disadvantage, arising from the inflection of light, which the wire micrometer labours under, and which interferes in the exact contact between the line and the luminous body.

The accelerating velocity of angular change was thus vigilantly watched, until the commencement of the year 1836, when an unexpected phenomenon took place. Instead of the appulse which a careful projection, drawn from the above elements, had led me to expect, I was astonished, on gazing at its morning apparition in January, to find it a single star! In fact, whether the real discs were over each other or not, my whole powers, patiently worked from 240 to 1200, could only make the object round. I instantly announced this singular event to my astronomical friends, but the notice was received with less energy than such a case demanded; none of the powerful refractors in this country were pointed to it in time; and it is to be regretted, that we had not the benefit of the unexcelled Dorpat telescope's evidence, at the critical epoch in question. This state of apparent singleness may have existed during the latter part of 1835, for when I caught it, it was very near a change. At length, about the beginning of June, 1836, a letter arrived from Sir J. Herschel, addressed to Baily, wherein he detailed his observations on the single state of this star, at the villa of Feldhausen, Cape of Good Hope, in his 20ft reflector. Under the date of February 27th, that unwearied astronomer says:

> "γ Virginis, at this time, is to all appearance a single star. I have tormented it under favourable circumstances, with the highest powers I can apply to my telescopes. consistently with seeing a well-defined disc, till my patience has been exhausted; and that lately, on several occasions, whenever the definition of the stars generally, in that quarter of the heavens, would allow of observing with any chance of success, but I have not been able to procure any decisive symptom of its consisting of 2 individuals."

The companion now took such a movement, as quite to confute a large predictive diagram I had constructed, showing that the orbit was extremely elongated, more like a comet's than a planet's; which gave me a suspicion that we had been looking at the ellipse the wrong way. Hereupon I returned to the Herschelian process to obtain the elements of the apparent and the true ellipse, with my new measures, but could neither accommodate the period, nor arrive at any satisfactory conclusions. When therefore M. Mädler's masterly computations appeared in the *Astronomische Nachrichten*, 363, my views were greatly countenanced; but with a full value for the talent and zeal of that astronomer's process, I was still anxious for Sir John Herschel to return to his own field, and meet the apparently unaccountable informalities which still remained. Having made a request to this effect, he replied:

> "*Maugre* I cannot yet send you any finalities about γ Virginis, yet to prove that I have not been quite idle, I will state one or two general conclusions that a projection of the observations has led me to, preparatory to exact numerical computation. 1. We are *all wrong*, Mädler and all of us, and it is the early observation of Bradley in 1718 which has misled us. That observation is totally incompatible with *any* reasonable ellipse, and must be absolutely rejected. Had it not been for my respect for that single observation I should have got very near the true ellipse in my first approximation. 2. The period is short of 150 years. My conjecture, antecedent to *any* exact calculation from my projection, is 143, which is considerably less than the least of Mädler's, and beyond his assigned limits of error. 3. I suspect Mädler's perihelion to be half a year too early, and that the true perihelion passage took place at 1836·6, or thereabouts. We shall get on better now that we have found out the black sheep."

Thus duly authorised, I attacked the orbit again, rejecting, with some regret, Bradley, Pound, Cassini, and Mayer, and assuming ♅.'s observations of 1780 as the point of departure. Taking, therefore, the epochs from that date to 1843 for abscissæ, and the observed angles for ordinates, a fresh set of periods was obtained, through which the interpolating curve was led, on a very large scale*. From the interpolated positions corresponding to the *assumed dates* between 1780 and 1843, the intervals being first decennial, then quinquennial, and afterwards more rapid still, the angular velocities were concluded, and by their aid the distances as radii vectores. These positions and distances were laid down from the central star as an origin of polar co-ordinates. Now, though this is a simple and merely graphic process of obtaining the elements of both the apparent and true ellipse, and is liable to shakiness, it undeniably shows the physical fact of a highly elongated orbit; and several of the conditions prove that, notwithstanding the present anomalous differences, we are arriving near the mark. It is singular how all the determinations of the excentricity have agreed, thus:

---

* Sir John Herschel informs me, that he has disused the method of drawing tangents for the angular velocities. The substitute is a closer reading off of the curve, equalising the differences on paper, and thence deducing the angular velocities by first and second differences (if needed); but first will generally suffice.

	First Orbit.	Second Orbit.		First Orbit.	Second Orbit.
Encke . . .	0·890	0·860	Mädler . . .	0·864	0·868
Herschel II. .	0·887	0·834	Myself . . .	0·883	0·872

As the ellipse projected by Sir John Herschel, under *all* the epochs, has been given, the reader may like to see the figure produced by the Bedford observations, which yields a period of about 180 years:

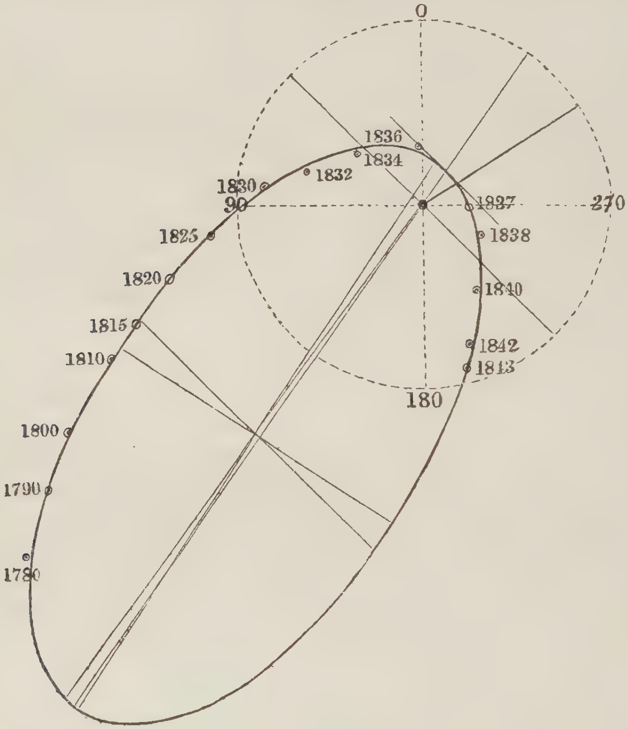

Fig. 24. Orbit of γ Virginis as found by Admiral Smyth in 1843.

As the resulting elements, though better, were still unsatisfactory, I was about to take another point of departure, and try again, when I received a letter from Sir John Herschel, dated Collingwood, 9th July, 1843, of which the following is an extract:

“I wrote to you last, that I could not make Bradley's observations agree with *any* ellipse consistent with the later observations, and that Mädler's elements, which assume the correctness of that observation, are inadmissible. I have now satisfied myself that this is really the case, and that Mädler's period admits of being yet reduced. But still it is necessary to suppose materially greater errors *in one direction* over the whole interval 1828, 1829, 1830, 1831, than I quite like. The mean of Dawes's and my own measures, however, is on the whole exceedingly well represented in all the critical and puzzling part of the orbit corresponding to 1830—1834 inclusive. Your observations of 1831, 1832, and 1833, offer discordancies of + 2°, + 2½°, and + 3°, which are, considering the then considerable closeness of the stars, not more than might well be committed. But Struve's are quite inexplicable;—his errors, supposing the orbit correct, run thus:

1825	1828	1829	1831	1832	1833	1834
+ 1°	+ 3°	+ 3½°	+ 4½°	+ 5°, + 7°	+ 6°	+ 7½°

after which the deviation ceases.

"On the whole I consider the proofs of gravitation afforded by this star quite satisfactory. It is true that I am forced to admit an error of − 3½° in my father's measure of 1781, and an error exceeding 2° in the same direction in his subsequent mean result for 1803; but when I recollect what sort of micrometer and apparatus he used, I am not disposed to quarrel with these.

"I am not satisfied with my inclination and node, and there is still a tendency in the curve of the star, if your measures of this year be correct, to run away from its proper course, *to bolt;* which leads me to believe that these elements are not yet so well determined as I hope to get them. Your ellipse from the Bedford observations is a very beautiful one, but I have not yet compared your elements with the observations. I am somewhat surprised at the length of your period, as I find 126 years represents the mean of all the observations (including Struve's) on the whole well. I have been chiefly attending to improving the *method* as a working one, and I am preparing a paper on the subject, in which the orbit of γ will occur in exemplification. What I aim at is, a *direct process* leading to the separate correction of each element, in place of a turmoil of calculus on the principle of least squares, which in cases of such discordant observations is, if not illusory, at least unnecessarily troublesome."

[It does not appear that of late years much attention has been paid to this star by computers, and we still remain a good deal in the dark as to its orbit. We can say now little more than Smyth said above, namely, that its period is "about 180 years." Thiele says 185^{y}, Adams 174^{y}.]

852. 59 M. VIRGINIS. (h. 1386; H. 3155; Ʀ.)

	h. m. s.		s.
R. A.	**12 36 28**	Prec. +	3·03
Decl.	**N 12° 16′·1**	—— S	19″·80

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; lE; vsvmbM; 2 st p;" which means:—"bright; pretty large; little extended; very suddenly very much brighter in the middle; 2 stars precede." Engraved, Lassell, *Mem. R. A. S.*, vol. xxxvi. Pl. v. Fig. 23.

853. 42 H. V. COMÆ BERENICIS. (h. 1397; H. 3165; ℜ.)

		h.	m.	s.			s.
R. A.		12	36	50	Prec.	+	2·93
Decl.	N	33°	8′·8		——	S	19″·79

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; v B; v L; e E 70° ±; b M N; B * nr;" which means:—"a remarkable object; very bright; very large; extremely extended in the direction of about 70° with the meridian; brighter in the middle where there is a nucleus; there is a bright star near." Engraved, *Phil. Trans.*, 1833, Pl. vii. Fig. 76; *Phil. Trans.*, 1850, Pl. xxxvii. Fig. 9; Lassell, *Mem. R. A. S.*, vol. xxxvi. Pl. v. Fig. 24.

854. 274 H. I. DRACONIS. (h. 1410; H. 3181.)

		h.	m.	s.			s.
R. A.		12	37	41	Prec.	+	2·26
Decl.	N	75°	1′·5		——	S	19″·79

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; c S; R; gb M; ⁑ p;" which means:—"pretty bright; considerably small; round; gradually brighter in the middle; a double star precedes."

855. 10 H. I. VIRGINIS. (h. 1404; H. 3176; ℜ.)

		h.	m.	s.			s.
R. A.		12	37	44	Prec.	+	3·06
Decl.	N	2°	35′·3		——	S	19″·78

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p S; l E; mb M;" which means:—"considerably bright; pretty small; but little extended; much brighter in the middle."

856. 60 M. VIRGINIS. (h. 1408; H. 3182; ℜ.) CCCCLVII.

		h.	m.	s.			s.
R. A.		12	38	4	Prec.	+	3·02
Decl.	N	12°	9′·7		——	S	19″·78

A double nebula, in the centre of Virgo's left wing, lying *np* and *sf*, about 2′ or 3′ from centre to centre, the preceding one being extremely faint. The following, or brighter one, is that seen and imperfectly described by Messier in 1779, and is nearly between two telescopic stars vertically posited. [Engraved, *Phil. Trans.*, 1833, Pl. vii. Fig. 74.] A fine field is exhibited under the eye-piece, which magnifies 93 times, just as this object enters, because the bright little nebula 59 M. is quitting the *np* verge, and another small one is seen in the upper part, H. 3171: in fact, four nebulæ at once.

The hypothesis of Sir J. Herschel, upon double nebulæ, is new and attracting. They may be stellar systems each revolving round the other: each a universe, according to ancient notions. But as these revolutionary principles of those vast and distant firmamental clusters cannot for ages yet be established, the mind lingers in admiration, rather than comprehension of such mysterious collocations. Meantime our clear duty is, so industriously to collect facts, that much of what is now unintelligible may become plain to our successors, and a portion of the grand mechanism now beyond our conception, revealed. Sir J. Herschel exclaims, "How much is escaping us! How unworthy is it in them who call themselves philosophers, to let these great phenomena of nature, these slow but majestic manifestations of the power and the glory of God, glide by unnoticed, and drop out of memory beyond the reach of recovery, because we will not take the pains to note them in their unobtrusive and furtive passage, because we see them in their every-day dress, and mark no sudden change, and conclude that all is dead, because we will not look for signs of life; and that all is uninteresting, because we are not impressed and dazzled. . . . . . To say, indeed, that every individual star in the Milky Way, to the amount of eight or ten millions, is to have its place determined, and its motion watched, would be extravagant; but at least let samples be taken, at least let monographs of parts be made with powerful telescopes and refined instruments, that we may know what is going on in that abyss of stars, where at present imagination wanders without a guide!" Such is the enthusiastic call of one, whose father cleared the road by which we are introduced to the grandest phenomena of the stellar universe.

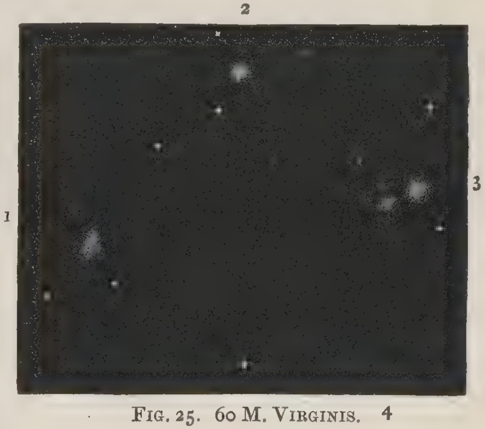

Fig. 25. 60 M. Virginis.

This mysterious and shadowy doublet will be found 5° W. of ε Virginis, in the direction of α Leonis, where there is a very large and wonderful nebulous region.

[Brodie describes No. 1 of the woodcut as "faint;" 2 and 4 "very faint;" and 3 "medium bright." No. 1=H. 3155; No. 2=H. 3171; No. 3=H. 3182; No. 4=H. 3180. Lord Rosse found No. 2. to be binuclear.]

857. 176 ♅. I. COMÆ BERENICIS. (h. 1414; H. 3189; ℜ.)

	h.	m.	s.			s.
R. A.	12	38	45	Prec.	+	2·93
		°	′			″
Decl.	N	32	48·7	——	S	19·77

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; p B; L; vm E 34·3°; sp of 2;" which means:—"a remarkable object; pretty bright; large; very much extended in the direction of 34·3° with the meridian; this is the *sp* of 2 nebulæ." The nebula which follows this (=177 ♅. I.; h. 1415; H. 3190) stands described as "!; p F; L; E 90° ±;" which means:—"a remarkable object; pretty faint; large; extended in the direction of about 90° with the meridian." The former object is engraved, *Phil. Trans.*, 1833, Pl. vii. Fig. 75; and the latter, *Phil. Trans.*, 1861, Pl. xxviii. Fig. 26. According to Lord Rosse these 2 nebulæ form one, the joining part being faint in the middle.

858. 142 ♅. I. VIRGINIS. (h. 1419; H. 3197.)

	h.	m.	s.			s.
R. A.	12	39	29	Prec.	+	3·05
		°	′			″
Decl.	N	3	38·9	——	S	19·76

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; i R; mb M; * 10 sp;" which means:—"bright; pretty large; irregularly round; much brighter in the middle; there is a 10th mag. star in the *sp* quadrant."

859. 15 ♅. I. VIRGINIS. (h. 1420; H. 3198.)

	h.	m.	s.			s.
R. A.	12	39	31	Prec.	+	3·07
		°	′			″
Decl.	N	0	8·6	——	S	19·76

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"B; vL; mE45°±; psbM;" which means:—"bright; very large; much extended in the direction of about 45° with the meridian; pretty suddenly much brighter in the middle."

860. 1678 Σ. VIRGINIS.

	h.	m.	s.			s.
R. A.	12	39	58	Prec.	+	3·01
		°	′			″
Decl.	N	14	58·2	——	S	19·75

	Position.		Distance.		Epoch.
	°		″		
SOUTH	213·4	...	33·3	...	1825·30
STRUVE, O.	209·1	...	32·8	...	1842·41
MÄDLER	204·8	...	32·7	...	1858·36
DOBERCK	200·4	...	31·9	...	1877·29
JEDRZEJEWICZ	200·5	...	32·4	...	1880·37

A double star. A 6½, very white; B 7½, yellowish white. Gledhill remarks:—"Rectilinear motion. The angle has diminished, but the distance has changed very little, if at all." I would rather say that the distance has certainly diminished. The amount may not be much, but the measures are very harmonious from first to last during a period of 52 years.

861. β CRUCIS.

	h.	m.	s.			s.
R. A.	12	41	17	Prec.	+	3·44
		°	′			″
Decl.	S	59	5·2	——	S	19·73

A conspicuous star of mag. 1½. In the same field with this, but about 1^{m} preceding it, there is a "most intense blood-red" star of mag. 8½.

862. 510 (?) Dunlop CENTAURI. (h. 3424; H. 3226.)

	h.	m.	s.			s.
R. A.	12	42	50	Prec.	+	3·28
		°	′			″
Decl.	S	40	42·3	——	S	19·71

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"pB; L; R; gbM; r;" which means:—"pretty bright; large; round; gradually brighter in the middle; hardly resolveable—mottled as if with stars."

863. 39 ♅. I. VIRGINIS. (h. 1436; H. 3227; 𝕽.)

		h.	m.	s.			s.
R. A.		12	42	54	Prec.	+	3·09
		°	′				″
Decl.	S	5	11·9		——	S	19·71

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; L; l E 45° ±; smb M r N;" which means:—"very bright; large; a little extended in the direction of about 45° with the meridian; suddenly much brighter in the middle where it exhibits a nucleus which shows indications of resolveability."

864. 129 ♅. I. VIRGINIS. (h. 1437, 3425; H. 3229; 𝕽.)

		h.	m.	s.			s.
R. A.		12	43	19	Prec.	+	3·10
		°	′				″
Decl.	S	8	3·9		——	S	19·71

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; R; vmb M r N; r;" which means:—"very bright; round; very much brighter in the middle where there is a nucleus which shows signs of resolveability."

865. 84 ♅. I. COMÆ BERENICIS. (h. 1451; H. 3249; 𝕽.)

		h.	m.	s.			s.
R. A.		12	45	0	Prec.	+	2·94
		°	′				″
Decl.	N	26	5·9		——	S	19·68

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; E; vg, vsvmb M e B N;" which means:—"very bright; very large; extended; at first very gradually, then very suddenly much brighter in the middle where it exhibits an extremely bright nucleus."

866. 196 P. XII. VIRGINIS. (Σ. 1682.) CCCCLVIII.

		h.	m.	s.			s.
R. A.		12	45	39	Prec.	+	3·11
		°	′				″
Decl.	S	9	44·4		——	S	19·64

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	308·7	33·6	1831·61
SMYTH	307·9	33·5	1834·41
DEMBOWSKI	306·9	32·3	1865·30

A neat but wide double star, between the Virgin's right arm and the tail of the Raven; about 8° W. ½ N. of *a*, and closely *sp* ψ Virginis, a star of the 5½ magnitude. A 6½, topaz yellow; B 9½, lucid purple, the colours finally contrasted.

867. 94 M. CANUM VENATICORUM. CCCCLIX.
(h. 1456; H. 3258; ℜ.)

		h.	m.	s.			s.
R. A.		12	45	43	Prec.	+	2·83
		°	′				″
Decl.	N	41	43·3		——	S	19·66

A [comet-like] nebula discovered by Méchain, in 1781, immediately preceding the crown on Charles's Heart. It is a fine pale-white object, with evident symptoms of being a compressed cluster of small stars. It brightens towards the middle, and the gradual augmentation of intensity from the margin to the centre of this apparently orbicular object is a direct proof of the real sphericity of the stellar mass. There are several small stars in the field, of which one in the *sf* quadrant is double. 2½° N.W. of α Canum Venaticorum

[Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 41; Lassell, *Mem. R. A. S.*, vol. xxxvi. Pl. v. Fig. 25.]

868. 202 P. XII. COMÆ BERENICIS. (Σ. 1685.) CCCCLX.

		h.	m.	s.			s.
R. A.		12	46	29	Prec.	+	2·98
		°	′				″
Decl.	N	20	46·2		——	S	19·64

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	202·0	15·8	1782·30
Struve, W.	200·8	15·8	1829·87
Smyth	201·9	16·2	1838·28
Main	200·2	15·7	1863·20

A neat double star, between Berenice's Hair and Virgo's left wing: it lies due W. of α Boötis, or on its parallel, at the distance of 22°, where a line dropped S. from α Canum Venaticorum will intercept it. A 7½, and B 8, both white; other stars in the field, but small and distant. A comparison of the measures affords presumptive proof of fixity.

[2° S. of 35 Comæ Berenicis.]

869. 25 Ħ. I. VIRGINIS. (h. 1462; H. 3274.)

		h.	m.	s.			s.
R. A.		12	46	45	Prec.	+	3·01
		°	′				″
Decl.	N	11	54·6		——	S	19·65

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; R; psb M; p of 2;" which means:—"bright; pretty large; round; pretty suddenly brighter in the middle; the preceding of 2 nebulæ." The other nebula here mentioned is 75 Ħ. II. (see *post*). About 2½° preceding ε Virginis, a 3rd mag. star.

870. κ CRUCIS. (h. 3435; H. 3275.)

	h.	m.	s.			s.
R. A.	12	47	7	Prec.	+	3·53
	°	′				″
Decl.	S 59	45·2		——	S	19·62

A fine cluster of bright stars. This was described by Sir J. Herschel as one of the most beautiful objects of the kind in the heavens. It consists of about 110 stars from the 7th magnitude downwards, 8 of the more conspicuous of them being coloured various shades of red, green, and blue. "No nebula is perceptible in any part of the extent of this cluster, which though neither a large nor a rich one is yet an extremely brilliant and beautiful object when viewed through an instrument of sufficient aperture to show distinctly the very different colours of its constituent stars, which give it the effect of a superb piece of fancy jewellery." (*Cape Obs.* p. 17.) This cluster was very carefully examined and its constituent stars mapped in 1872 by Mr. W. C. Russell of the Sydney Observatory. His paper will be found in *Month. Not. R. A. S.*, vol. xxxiii. p. 66. Russell found 25 stars not mentioned by Herschel; on the other hand, he could not find 5 stars noted by Herschel. He adds:—"Many of the stars have drifted considerably since the Cape drawing was made."

Engraved, *Cape Obs.*, Pl. i. Fig. 2; [in which the N. and S. points are erroneously reversed]; and Russell, *Month. Not., ubi supra.*

871. 75 ♅. II. VIRGINIS. (h. 1466; H. 3278; 𝕽.) CCCCLXI.

	h.	m.	s.			s.
R. A.	12	47	20	Prec.	+	3·01
	°	′				″
Decl.	N 12	49·5		——	S	19·63

A pale elliptical nebula, in the middle of Virgo's left wing. This is a fine object trending *sp* and *nf*, nearly in the vertical, but from its superior brightness at the S., or upper end, it rises while gazing from the dumpy egg-shape to that of a paper kite: over it is an arch formed by three telescopic stars, the symmetry of which is so peculiar as to add to that appearance. These stars trend, by two very faint ones, to a round nebula [H. 3274] in the *np* quadrant, preceded by two stars of the 10th magnitude. 2½° distant from ε Virginis on the western parallel.

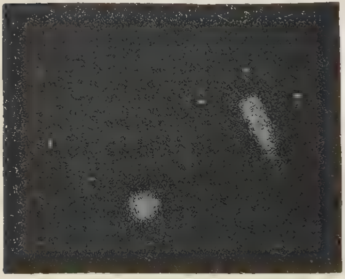

FIG. 26. 75 ♅. II. VIRGINIS.

["The above sketch is very unlike the originals."—*Brodie.* H. 3278 is engraved, *Phil. Trans.*, 1833, Pl. viii. Fig. 84.]

872. 35 COMÆ BERENICIS. (Σ. 1687.) CCCCLXII.

	h. m. s.		s.
R. A.	12 47 53	Prec. +	2·96
	° ′		″
Decl.	N 21 50·6	—— S	19·63

		Position.	Distance.	Epoch.
		°	″	
Smyth	A B	30	1	1834·38
	A C	126·5	28·8	
Morton	A B	45·4	1·44	1857·28
	A C	124·2	28·16	
Doberck	A B	61·5	1·40	1877·27
	A C	124·1	28·68	

A delicate triple star, between the Tresses and the Virgin's northern wing, about 7° S.S.E. of its own *lucida*, and 20° W. of *a* Boötis. A 5, pale yellow; B, indistinct; C 10, cobalt blue. Of this object A and C were classed as a double star, and registered 130 H. V.; but Σ. detected B, and rendered it a fine but extremely difficult triple. Indeed, the latter was so involved in the moulds and twirls of the primary, that but for A and B pointing directly upon a 12th magnitude star in the *nf* quadrant, the estimation of angle and distance would have been hardly possible.

[The close pair are clearly in motion, but there is no evidence of change in the distant star.]

873. 5317 Lac. CENTAURI.

	h. m. s.		s.
R. A.	12 48 7	Prec. +	3·46
	° ′		″
Decl.	S 56 34·6	—— S	19·62

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	16·0	42 *est.*	1834·25

A double star. A 5; B 6.

874. 32 Hev. CAMELOPARDI. (Σ. 1694.) CCCCLXV.

	h. m. s.		s.
R. A.	12 48 16	Prec. +	0·29
	° ′		″
Decl.	N 84 0·7	—— S	19·61

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	327·0	21·0	1822·28
Dunér	326·7	21·6	1872·99
Jedrzejewicz	326·4	21·6	1877·62

A neat double star, near the animal's ear; it is nearly 7° S. by E. from

Polaris, and forms the vertex of a nearly isosceles triangle with that star and δ Ursæ Minoris. A 6 and B 6½, both bright white; a third star in the *sp*, but only of the 11th magnitude. It appears to have no motion either in angle or distance.

[Colours "not quite a match," 1863.—*Webb.* Dunér terms both "jaune."]

[A is 232 P. XII. In the B. A. C. the star marked 232 P. XII. is ascribed to Ursa Minor.]

875. 134 H. I. VIRGINIS. (H. 3292.)

	h. m. s.		s.
R. A.	12 48 38	Prec. +	3·12
	° ′		″
Decl.	S 9 56·4	—— S	19·61

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; v L; m E;" which means:—"considerably bright; very large; much extended."

876. 221 P. XII. VIRGINIS. (Σ. 1689.) CCCCLXIII.

	h. m. s.		s.
R. A.	12 49 59	Prec. +	3·01
	° ′		″
Decl.	N 12 5·7	—— S	19·58

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	196·3 ...	29·17 ...	1823·40
SMYTH	197·9 ...	29·1 ...	1831·38

A neat double star, near the middle of Virgo's northern wing; preceding ε on the parallel by only 2° [and a little N.], and therefore readily fished up by the out-door gazer. A 7½, pale white; B 9, sky blue. This object is thus described by Piazzi: "Duplex. Socia 10^{ae} magnit. 0·6″ temporis præcedit, 20″ circiter ad austrum."

877. 243 H. I. URSÆ MAJORIS. (h. 1483; H. 3315.)

	h. m. s.		s.
R. A.	12 50 28	Prec. +	2·59
	° ′		″
Decl.	N 58 55·9	—— S	19·58

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p S; vl E; vgb M;" which means:—"bright; pretty small; very little extended; very gradually brighter in the middle."

878. α CANUM VENATICORUM. (Σ. 1692.) CCCCLXVI.

R. A. 12h. 50m. 53s. | Prec. + 2s·84
Decl. N 38° 54′·7 | —— S 19″·57

	Position.		Distance.		Epoch.
Herschel, W.	228°·5	...	20″·00 ±	...	1780·60
Smyth	227·0	...	19·8	...	1837·39
Dunér	227·7	...	19·8	...	1869·44
Jedrzejewicz	227·5	...	20·0	...	1877·73

A fine double star, the *lucida* of the heart placed between Asterion and Chara. A 2½, flushed white; B 6½, pale lilac; a third star at a distance on the N. vertical. This is a *Nautical Almanac* star, and a fine object. There has been no appreciable alteration in position or distance.

This star is the leader of Ptolemy's ἀμόρφωτοι to the Great Bear, and it appears on the Borgian globe. Ulugh Beigh records it by the Arabian designation *Kabd-al-asad,* liver of the lion, and there is abundance of evidence to prove that it was pretty notorious among astronomers. But it came to pass that it was named Cor Caroli by Halley, at the suggestion of Sir C. Scarborough, after a worthless man's heart. The popular story, or rather the vulgar one, runs,—how Scarborough, the court physician, gazed upon a star the very evening before the return of King Charles II. to London, the which, as in duty bound, appeared more visible and refulgent than heretofore; so the said star, which Hevelius had already made the lucida of Chara's collar, was thereupon extra-constellated within a sort of Valentine figure of a heart, with a royal crown upon it; and so the monarch, it would seem, by this extraction, remained heartless. Though this pretty symbol appears as a tail-piece to the preface of the *Atlas Cœlestis,* Flamsteed has not honoured it with a place on the plate of the Hounds.

Cor Caroli is readily found by alignment. With the three stars of the Greater Bear's tail as the head of a paper kite, it forms the tail end; or a line from the Pole-star over ε Ursæ Majoris will point upon the heart. Another clue is obtained in the galley-rhyme:

When clear aloft, Boötes seek, his brilliance leads the gaze,
And on each side its glitt'ring gems the spacious arch displays;
Arcturus east to Wega join, the Northern Crown you'll spy;
But west, to Ursa's second star, he marks Cor Caroli.

The Canes Venatici form a new constellation, intruded into the heavens in recent times. Tycho Brahé, unfortunately less known by his excellence as a practical astronomer than as the author of an unmechanical system, had observed a couple of stars here; but Hevelius scraped together the *sporades* between the stern of the Bear and Boötes, and figured two Hounds, for the latter to chase the Bear with; that nearest the Pole he named Asterion, because the appellation is poetical, and it pleased him, and the southern one Chara: "Asterionis sociam, Charam appellavi, quòd fortè Booti, more venaticorum, canis illa fœmina, ob celeriorem ejus cursum, fuerit admodùm grata et chara." These dogs first appeared in the *Prodromus* of Hevelius, published by his widow, at Dantzig, in 1690. Since then, the number of its constituents has swelled very considerably, although, except Cor Caroli, the asterism offers little remarkable to the unassisted eye; they are thus registered:

Hevelius	23 stars.	Piazzi	45 stars.
Flamsteed	25 „	Bode	139 „

879. 64 M. COMÆ BERENICIS. CCCCLXVII.

(h. 1486; H. 3321; ℞.)

	h.	m.	s.			s.
R. A.	12	51	19	Prec.	+	2·95
			′			″
Decl.	N	22	16·9	——	S	19·55

A conspicuous nebula, between Berenice's Hair and the Virgin's left arm; discovered by M. in 1780, who, however, only saw it very faintly. Yet it is magnificent both in size and brightness, being elongated in a line *np* and *sf*, and blazing to a nucleus,

FIG. 27. 64 M. COMÆ BERENICIS.

Sir J. Herschel examined this nebula very minutely. He considered it to be resolveable, though not resolved; and adds, "I am much mistaken if the nucleus be not a double star, in the general direction of the nebula; 320 much increases this suspicion; 240 shows well a vacuity below the nucleus." My utmost endeavours only show it as in the sketch annexed.

[Engraved, *Phil. Trans.*, 1833, Pl. ii. Fig. 27; Lassell, *Mem. R. A. S.*, vol. xxxvi. Pl. vi. Fig 26.]

880. 417 B. URSÆ MAJORIS. (Σ. 1695.)

	h.	m.	s.			s.
R. A.	12	51	29	Prec.	+	2·67
		°	′			″
Decl.	N	54	41·4	——	S	19·55

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	289·1 ...	3·2 ...	1832·13
DUNÉR	287·0 ...	3·2 ...	1871·30

A double star. A 6½, white; B 9, ash. Dunér's colours are "Blanche; Azur clair," and his mags. 6½, 8.

881. 164 Dunlop MUSCÆ. (h. 3440; H. 3325.)

	h.	m.	s.			s.
R. A.	12	52	5	Prec.	+	3·90
		°	′			″
Decl.	S	70	16·7	——	S	19·54

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:— “⊕; B; L; R; g, vsb M; st 12;” which means:—“a globular cluster; bright; large; round; at first gradually, then very suddenly brighter in the middle; the component stars are chiefly of mag. 12.”

882. 311 Dunlop CRUCIS. (h. 3449; H. 3335.)

	h.	m.	s.			s.
R. A.	12	53	32	Prec.	+	3·57
		°	′			″
Decl.	S	59	0·3	——	S	19·51

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:— “Cl; L; p Ri; i R; st 10;” which means:—“a cluster; large; pretty rich; irregularly round; the component stars are chiefly of the 10th magnitude.”

883. 61 H. I. CORVI. (h. 1497; H. 3337.)

	h.	m.	s.			s.
R. A.	12	53	34	Prec.	+	3·15
		°	′			″
Decl.	S	14	27·2	——	S	19·51

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:— “B; R; psmb M; * 13 np;” which means:—“bright; round; pretty suddenly much brighter in the middle; there is a 13th mag. star in the *np* quadrant.”

884. 162 H. I. VIRGINIS. (h. 1498; H. 3342; R.)

	h.	m.	s.			s.
R. A.	12	53	58	Prec.	+	2·99
		°	′			″
Decl.	N	14	45·9	——	S	19·50

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:— “B; p L; m E 90°; sb M N; S * inv.;” which means:—“bright; pretty large; much extended in the direction of 90° with the meridian; suddenly brighter in the middle where it exhibits a nucleus; there is a small star involved in the nebula.” Engraved, Vogel, *Nebelflecken*, 1876, Pl. i. Fig. 10.

885. 44 VIRGINIS. (Σ. 1704.) CCCCLXVIII.

	h. m. s.		s.
R. A.	12 54 0	Prec. +	3·08
Decl.	S 3° 13′·6	—— S	19″·50

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	57·5	...	22·3	...	1782·10
STRUVE, W.	53·0	...	21·3	...	1830·63
WILSON and SEABROKE	53·0	...	21·9	...	1874·30

A delicate double star, on the lower part of Virgo's right or southern wing; lying 10° N.W. of α Virginis, in the direction of β Leonis. A 6, bright white; B 13, blue. This object is very difficult.

The discrepancies above are such as must be rather attributed to the errors of observation incident to so delicate a test, than to any perceptible motion in the individuals as to angle of position or alteration of distance.

886. 5360 Lac. CENTAURI. (*h. 4563.)

	h. m. s.		s.
R. A.	12 54 1	Prec. +	3·26
Decl.	S 33° 1′·8	—— S	19″·50

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	236·8	...	6·5	...	1837·35

A double star. A 7½; B 8.

887. 143 ♅. I. VIRGINIS. (h. 1509; H. 3356; 𝕽.)

	h. m. s.		s.
R. A.	12 55 5	Prec. +	3·05
Decl.	N 3° 5′·3	—— S	19″·48

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c E; *10 att 135° ± ;" which means:—"considerably bright; considerably extended; there is a 10th mag. star attached at an angle of about 135° with the meridian." Engraved, *Phil. Trans.*, 1833, Pl. vi. Fig. 67.

888. 9 DRACONIS.

R. A.	12h 55m 46s	Prec. +	2s·32
Decl.	N 67° 11′·5	—— S	19″·46

Webb describes this as a triple star. Mags. 6½, 6½, and 8. Two yellow, one bluish. I have been unable to find any measures of it.

889. ε VIRGINIS. CCCCLXIX.

R. A.	12h 56m 42s	Prec. +	3s·00
Decl.	N 11° 33′·0	—— S	19″·45

	Position.	Distance.	Epoch.
BURNHAM	120°·3	241″·3	1879·34

A star with a minute distant companion, on the upper extreme of the Virgin's left wing. A 3½, bright yellow; B [12], intense blue. This last colour on so small an object is very striking, and an astronomical friend, who examined it at my request, with powerful means, confirms both the tint and its intensity. The large star I suspect to be slightly variable.

This star appears, in various treatises on astronomy, as symbolizing the gatherer of grapes; but *Vindemiatrix*, in the Alphonsine Tables, is an adaptation of the longer word *Provindemiator* (*Vitruv.* ix. 4), a translation of προτρυγητὴρ, given to ε Virginis, because it rises in the morning, just before the vintage. (*Schol. in Arat.* 138.) Hence it became *Muḳdim-al-ḳiṭáf*, the forerunner of the vintage, among the Arabians.

On completing my examination of this star, I made a second search, at Baily's request, for 42 Virginis, which was missed by H. in 1828; but could find nothing in the place indicated in the Astronomical Society's Catalogue, No. 1490, except a star of the 10th magnitude. This answers to the R.A. pretty well, and differs in declination only within blundering distance: it may, therefore, be the lost 7th magnitude one retiring, and such retreats should be well watched. It is, however, singular that Baily could find no observation of 42 Virginis of the British Catalogue in Flamsteed's *Historia Cœlestis;* "nor," adds he, "can I discover that such a star exists." That fixed upon by Baron de Zach, and enrolled in his *Tabulæ Speciales* as 42, differs 3′ in R.A., and, what is remarkable, it is now also missing. Neither Piazzi, Lalande, nor Bessel has any star that can be mistaken for it. It may often happen that such anomalies arise from erroneous entries, but here at least De Zach's star was regularly observed and registered, and yet has probably disappeared from the visible heavens, for an indefinite period.

In star-gazing, Vindemiatrix may be identified by drawing an ideal line from α Ursæ Majoris to α Virginis, which will pass it at about one-quarter of the distance between those fine stars. Or it may be found nearly midway between α Boötis and β Virginis. α Virginis forms a remarkable triangle with α Boötis and β Leonis; and of the bright stars in this triangle, Vindemiatrix is the one nearest to the line joining α Boötis and the Lion's tail. Though only a secondary kind of star, it has been deemed of sufficient importance to meet the notice of the galley rhymster:

> Would you the star of Bacchus find, on noble Virgo's wing,
> A lengthy ray from Hydra's heart unto Arcturus bring;
> Two-thirds along that fancied line direct th' inquiring eye,
> And there the jewel will be seen south of Cor Caroli.

890. 411 Dunlop CENTAURI. (h. 3459; H. 3386.)

R. A.	12h 58m 57s	Prec.	+ 3s·45
Decl.	S 48° 41′·8	——	S 19″·40

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; vL; vmE 38·7°;" which means:—"bright; very large; very much extended in the direction of 38·7° with the meridian."

891. 130 H̥. I. VIRGINIS. (h. 3465; H. 3397; 𝕽.)

R. A.	13h 0m 5s	Prec.	+ 3s·11
Decl.	S 7° 25′·5	——	S 19″·37

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"vB; pS; E 0° ±; bMBN;" which means:—"very bright; pretty small; extended in the direction of the meridian or thereabouts; brighter towards the middle where it exhibits a bright nucleus."

892. θ MUSCÆ.

R. A.	13h 0m 57s	Prec.	+ 3s·73
Decl.	S 64° 43′·2	——	S 19″·36

	Position.	Distance.	Epoch.
Herschel, J.	187°·5 ...	5″·8 ...	1836·38

A double star. A 6½; B 9.

893. 3468 h. CENTAURI. (H. 3413.)

	h.	m.	s.			s.
R. A.	13	2	24	Prec.	+	3·48
		°	′			″
Decl.	S	48	55·0	——	S	19·32

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; R; gmb M;" which means:—"bright; pretty large; round; gradually much brighter in the middle."

894. θ VIRGINIS. (Σ. 1724.) CCCCLXX.

	h.	m.	s.			s.
R. A.	13	4	15	Prec.	+	3·10
		°	′			″
Decl.	S	4	57·0	——	S	19·32

		Position.		Distance.		Epoch.
		°		″		
Main	A B	347·8	...	6·7	...	1862·31
Stone, O.	A B	346·4	...	7·1	...	1879·30
Burnham	A B	344·6	...	7·1	...	1880·37
	A C	297·1	...	70·8		

A triple star on the lower part of the Virgin's southern wing; and 7° to the N.W. of *a*. A 4½, pale white; B 9, violet; C 10, dusky.

895. 42 COMÆ BERENICIS. (Σ. 1728.) CCCCLXXI.

	h.	m.	s.			s.
R. A.	13	4	39	Prec.	+	2·95
		°	′			″
Decl.	N	18	6·6	——	S	19·26

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	9·5	...	0·64	...	1827·83
Struve, O.	11·4	...	0·48	...	1850·39
Struve, O.	185·6	...	0·43	...	1861·42
Wilson and Seabroke	186·4	...	0·5	...	1876·36
Burnham	192·2	...	0·68	...	1879·37
Jedrzejewicz	14·3	...	*oblong*	...	1880·41

A binary star, between Berenice's hair and the Virgin's left hand. A 4½, and B 5, both pale yellow. It was discovered by Σ., and recorded as a high class "vicinissimæ."

When I first attacked this object in 1832, it appeared quite round; and I several times returned to it with similar results. In 1839, however, though I could not raise a vacancy between the individuals, or even palpably notch them, the elongation was so distinct, under a power magnifying 850 times, as to be capable of a tolerable estimation.

42 Comæ is placed fortunately for the out-door gazer, being mid-way between *α* Boötis and *β* Leonis on the parallel, and vertically half-way from *α* Virginis to *α* Canum Venaticorum.

[This binary is as remarkable for the closeness of its components, even when at their maximum distance, as for the shortness of its period, which is certainly no more than about 25ʸ. Observations of it are at all times very difficult, hence different observers often take different stars for their A and so get position angles varying by 180°.]

896. 96 ♅. I. CANUM VENATICORUM.

(h. 1547; H. 3437; ℞.)

	h.	m.	s.			s.
R. A.	13	5	51	Prec.	+	2·78
	°	′				″
Decl. N	37	39·2		——	S	19·23

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; v L; vm E 25°; vsb MN;" which means:—"very bright; very large; very much extended in the direction of 25° with the meridian; very suddenly brighter in the middle where it exhibits a nucleus."

897. 53 M. COMÆ BERENICIS. CCCCLXXIV.

(h. 1558: H. 3453; ℞.)

	h.	m.	s.			s.
R. A.	13	7	30	Prec.	+	2·94
	°	′				″
Decl. N	18	45·3		——	S	19·19

A globular cluster, between Berenice's tresses and the Virgin's left hand, with a coarse pair of telescopic stars in the *sf* quadrant, and a single one in the *sp*. This is a mass of minute stars, from the 11th to the 15th magnitudes, and from thence to gleams of star-dust, with stragglers to the *np*, and pretty diffused edges. From the blaze at the centre, it is evidently a highly compressed ball of stars, whose law of aggregation into so dense and compact a mass is utterly hidden from our imperfect senses. It was resolved into stars by Sir W. Herschel.

["Not compressed to one point, but apparently to 4 or 5 different points within a small area."—*Parsonstown Obs.*]

The contemplation of so beautiful an object cannot but set imagination to work, though the mind may be soon lost in astonishment at the stellar dispositions of the great Creator and Maintainer. Thus, in reasoning by analogy, these compressed globes of stars confound conjecture as to the modes in which the mutual attractions are prevented from causing the universal destruction of their system. Sir J. Herschel thinks that no pressure can be propagated through a cluster of discrete stars; whence it would follow that the permanence of its form must be maintained in a way totally different from that which our reasonings suggest.

Before quitting this interesting ball of innumerable worlds, I may mention that it was examined by Sir J. Herschel, with Mr. Baily, in the 20^{ft} reflector; and that powerful instrument showed the cluster with curved appendages of stars, like the short claws of a crab running out from the main body. It is easily found by its being about 1° N.E. of 42 Comæ Berenicis, the alignment of which has already been given.

898. 54 VIRGINIS. CCCCLXIII.

	h.	m.	s.			s.
R. A.	13	7	33	Prec.	+	3·19
		°	′			″
Decl.	S	18	14·5	——	S	19·19

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	33·7	...	6·7	...	1823·28
Smyth	33·5	...	5·7	...	1839·30
Main	31·8	...	5·4	...	1862·31
Stone, O.	33·9	...	5·3	...	1877·30

A neat double star, between the Virgin's right hand and Hydra; where a line from *α* Boötis carried through *α* Virginis, and 8° beyond, will hit it. A 7, and B 7½, both white.

899. 97 ♅. I. CANUM VENATICORUM.
(h. 1564; H. 3459; 𝕽.)

	h.	m.	s.			s.
R. A.	13	8	23	Prec.	+	2·77
		°	′			″
Decl.	N	37	10·8	——	S	19·17

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; pl; E 166·8°; smb M v BN; * np;" which means:—"very bright; pretty large [? large]; extended in the direction of 166·8° with the meridian; suddenly much brighter in the middle where there is a very bright nucleus; there is a star on the north preceding side."

Engraved, Rosse, *Dublin Trans.*, 1879, Pl. iii. Fig. 3459.

900. 25 P. XIII. VIRGINIS. CCCCLXXV.

	h.	m.	s.			s.
R. A.	13	9	11	Prec.	+	3·14
		°	′			″
Decl.	S	10	46·4	——	S	19·15

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	61·6	44·8	1823·35
Smyth	62·8	42·4	1831·38

A wide double star, preceding the Virgin's right hand, 2½° *p a*. A 7½, and B 8½, both bluish. This object though coarse is not without interest, especially in a moderate telescope.

901. 63 M. CANUM VENATICORUM. CCCCLXXVI.

(h. 1570; H. 3474; ℜ.)

	h.	m.	s.			s.
R. A.	13	10	53	Prec.	+	2·70
		°	′			″
Decl.	N	42	36·7	——	S	19·11

An oval nebula, on the chest of Asterion, the northern dog; discovered by Méchain in 1779. This object is of a milky-white tint, and brightens in the centre, where the nucleus resembles a small star. It is placed between two telescopic stars which cross the parallel vertically, while closer to it in the *sp* is a third. Sir W. Herschel figured this object in *Phil. Trans.* 1811, and described it as very bright, extending from *np* to *sf*, 9′ or 10′ long, and near 4′ broad, with a very brilliant nucleus. It bears N.N.E. 5½° from *α* Canum Venaticorum, on the line indicated from *β* Leonis through Charles's Heart.

[The Earl of Rosse found indications of a spiral structure, and Huggins a continuous spectrum.]

902. 138 ♅. I. HYDRÆ. (h. 3480; H. 3477.)

	h.	m.	s.			s.
R. A.	13	12	5	Prec.	+	3·27
		°	′			″
Decl.	S	26	16·3	——	S	19·08

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; S; R; vsmb M; * 10 f;" which means:—"very bright; small; round; very suddenly much brighter in the middle; a 10th mag. star follows."

903. 3483 h. CENTAURI. (H. 3480.)

	h. m. s.			s.
R. A.	13 12 31	Prec.	+	3·52
	° ′			″
Decl.	S 47 19·9	——	S	19·06

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; R; pslb M;" which means:—"bright; small; round; pretty suddenly less bright in the middle."

904. 63 P. XIII. COMÆ BERENICIS. CCCCLXXVIII. (Σ. 1737.)

	h. m. s.			s.
R. A.	13 16 27	Prec.	+	2·93
	° ′			″
Decl.	N 18 20·6	——	S	18·95

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	220·4 ...	15·1 ...	1829·30
BURNHAM	220·2 ...	15·1 ...	1878·27

A delicate double star, preceding the right foot of Boötes. A 8, white; B 13, blue; and a line through them passes near a brightish distant star in the *nf* quadrant. Σ., in the Catalogue of 1827, mistook his No. 1736 for 63 P. XIII., which he has therefore since rejected; but it is, no doubt, his No. 1737, though the identity of the apparent place is not quite exact. It lies 14° W. by S. from *a* Boötis, in the line projected from that star towards *β* and *a* Leonis; or rather less than half-way between the first two. This pair is identical with the pair 57 H. IV., there being an error of + 43′ in Sir W. Herschel's declination.

905. 482 Dunlop CENTAURI. (h. 3501; H. 3535.)

	h. m. s.			s.
R. A.	13 18 59	Prec.	+	3·48
	° ′			″
Decl.	S 42 26·6	——	S	18·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!; v B; v L; vm E 122·5°; bifid;" which means:—"a very remarkable object; very bright; very large; very much extended in the direction of 122·5° with the meridian; bifid, *i.e.* with a channel running through it."

Engraved, *Cape Obs.*, Pl. iv. Fig. 2.

906. α VIRGINIS. CCCCLXXIX.

R.A.	$13^{h}\ 19^{m}\ 24^{s}$	Prec.	$+\ 3^{s}{\cdot}15$
Decl.	S $10^{\circ}\ 35'{\cdot}2$	——	S $18''{\cdot}86$

	Position.		Distance.		Epoch.
Burnham	$61^{\circ}{\cdot}9$	...	$359''{\cdot}8$	...	1879·35

A *Nautical Almanac* star, in the Virgin's right hand. A 1, brilliant flushed white; B 10, bluish tinge. This beautiful bright star is in a clear dark field, and, in a manner, insulated, for it has no companion nearer than the one here described.

α Virginis is the Στάχυς, Spica, As-Sumbuleh, or ear of corn, of the Greeks, Latins, and Arabians. It is also designated *As-Simák-al-a'zal,* the unarmed or defenceless Simák; and Chrysococcas calls it, in reference to Arcturus, Μικρὸς κονταράτος, the little lance-bearer. The meaning of Simák is uncertain.

This star has strong claims to regard, as affording presumptive evidence that Hipparchus, the first astronomer on record who really made systematic observations, was acquainted with the fact of the precession of the stars, or rather the retrogradation of the equinoctial points. The argument which supports this opinion, is the comparison which this celebrated philosopher made of the places of Spica, determined by himself, with those assigned to it by Aristyllus and Timocharis, about 170 years previously. This lover of truth, as Ptolemy styles him, bestowed intense application to both the theoretical and practical branches of astronomy. From a difference which he detected between some early observations of this star, and the place which he determined for it by two lunar eclipses, he entertained a suspicion that there existed an inequality in the length of the solar year. It is therefore probable that, in order to ascertain this point, he made comparisons with the ancient registers of celestial phenomena, especially that of a solstice which had been made by Aristarchus, or Archimedes, at the end of the 50th year of the first Calippic period, B.C. 281, or 145 years before his own observation. The latter circumstance was decisive, for there appeared a difference of 12^{h} between the calculation and the observation, on the supposition that the year consisted of $365\frac{1}{4}$ days; but $\frac{0{\cdot}5}{145}$ is = ·00345, or nearly $\frac{1}{300}$, therefore that supposition seemed to be in excess about $\frac{1}{300}$ of a day, and Hipparchus concluded that the number of days in a tropical year was $= 365+\frac{1}{4}-\frac{1}{300}, = 365{\cdot}24655$. This value is greater than the truth by $6^{m}\ 13^{s}$ only; since, according to La Place, the length of the tropical year at that time must have been equal to 365·242215 days, or about $4{\cdot}2^{s}$ shorter than in the present age. By such a result much was gained, but Hipparchus, conscious of the uncertainty attending the observations of the solstices, from the smallness of the variations in the lengths of the shadows cast by the gnomon, employed the method of the equinoxes, by observations made with the equatorial armillæ. Under these means, with the lapse-epoch of 33^y afforded by his own results, his expanded mind approximated to the exact length of the tropical year; a grand step in the solar theory, not only on account of its utility in the regulation of the calendar, but also because upon it depend the elements of the apparent solar orbit. See α Leonis.

Virgo, *παρθένος*, is one of the old 48 constellations; being the sixth sign in zodiacal order, and the last of the summer signs. According to mythology, the lady represents Ceres, or Isis, or Parthenos, or Erigone, or the Singing Sibyl, or some one else, who wore a stern but majestic countenance; though the scales at her feet seemed to fix her as Astrea or Justitia. She is considered as symbolising the Earth, the producer of fruits and animals.

We are told, that in Ogygian ages and among the Orientals she was represented as a sun-burnt damsel, with an ear of corn in her hand, like a gleaner of the fields; but the Greeks, Romans, and moderns have concurred in depicting her as a winged angel, holding wheat-ears, typical of the harvest, which came on in the time of the Greeks as the sun approached this star. She forms a conspicuous and extensive asterism replete with astronomical interest; but astrologers, nothing daunted by classic attributes, stigmatised it as a barren sign, and the illuminated manuscript Almanack of 1386 tells us that whoever is born under the dominance of its earthy triplicity, he shall "wythowten gylt be blamed." The constituents have been thus numbered:

Ptolemy	32 stars.	Bullialdus . . .	43 stars.
Copernicus . . .	32 "	Hevelius	50 "
Tycho Brahé . .	39 "	Flamsteed . . .	110 "
Bayer	42 "	Bode	411 "

and there were moreover 323 nebulæ enrolled within its boundaries, by the unrivalled scrutiny of the elder Herschel.

To find the *lucida* of this constellation by alignment is easy enough. A long line through the conspicuous stars α and γ Ursæ Majoris will pass close to Spica, which makes nearly an equilateral triangle with α Boötis and β Leonis, in the Lion's tail. Or a line from Polaris through ζ Ursæ Majoris, the 6th of the large stars, or middle of the tail, passes, at 70° distance, through Spica:

From the Pole-star through Mizar glide with long and rapid flight,
Descend, and see the Virgin's spike diffuse its vernal light.
And mark what glorious forms are made by the gold harvest's ears,
With Deneb west, Arcturus north, a triangle appears;
While to the East a larger still, th' observant eye will start,
From Virgo's spike to Gemma bright, and then to Scorpio's heart.

907. ζ URSÆ MAJORIS. (Σ. 1744.) CCCCLXXX.

R.A.	13h 19m 29s	Prec.	+ 2s·42
Decl.	N 55° 30′·1	——	S 18″·86

	Position.		Distance.		Epoch.
	°		″		
BRADLEY	143·1	...	13·88	...	1755·00
HERSCHEL, W.	146·8	...	14·50	...	1779·63
STRUVE, W.	145·3	...	14·24	...	1819·70
SMYTH	147·4	...	14·4	...	1839·32
DEMBOWSKI	148·0	...	14·24	...	1852·14
JEDRZEJEWICZ	148·6	...	14·57	...	1878·01

A splendid double star, conspicuous in the middle of Ursa Major's tail, but rejected from the *Nautical Almanac* list in 1830. A 3, brilliant white; B 5, pale emerald; a distant bluish star of the 8th magnitude, with minute companions, in the *sf* quadrant; and Alcor, of the 5th, away down in the *nf*, at a Δ of R.A.$=77{\cdot}5^s$, [or 11′ 47″ of a great circle].

As a proper motion has been pronounced to be peculiar to both stars, they would appear to be connected, or their apparent motion is parallactic; but H̥. thought he detected a retrograde change of position $=5^\circ\ 32'$ in $20^y\ 319^d$, on which he remarks: "this cannot be accounted for by a parallactic motion of ζ, which would have occasioned a contrary change of the angle." His earlier observations suggested to him an idea that the distance was also rapidly increasing; but both these opinions were dissipated by the later observations.

W. Struve made some elaborate observations on these stars, in 1814 and 1815, for the investigation of their parallax and the aberration of light. The results, however, effected little more than disproving the hypothesis of Fuss and Soldner, in the Berlin Ephemerides for 1785 and 1803.

In 1723, a German astronomer thought he had discovered a new wandering star near ζ, and not remarking that it was a strange location for a planet, immediately dubbed it *Sidus Ludovicianum*, in honour of his sovereign, Louis V., Landgrave of Hesse Darmstadt. This was probably the 8th magnitude star to the southward of Alcor, which was first noticed by D. Einmart, the Nuremberg astronomer, in 1691. About 60 years afterwards, M. Flaugergues was wont to try his telescopes on ζ, without ever noticing its being double; but in August, 1787, he was astonished to find that it was composed of two stars. On continuing to observe them closely, he found a continual augmentation in the distance, and that the smaller component had increased in size and brightness:

"Ce progrès est actuellement bien sensible, et il y a au moins quinze secondes de distance entre elles, c'est-à-dire, trois ou quatre fois plus que lorsque je fis cette observation." This must have been merely the effect of becoming better acquainted with the object before him.

But there is no end of mistakes respecting ζ Ursæ Majoris, for it has since been frequently observed by continental astronomers as a single star. Hence it is the supposed cause of several discrepancies, in results of movement, more especially in those of Méchain, at Barcelona, in 1792. Nicollet, in discussing the operations of the French meridian, states that the telescopes attached to the repeating-circles used by Delambre and Méchain were unable to separate Mizar. This was so limited a performance for instruments on such an important service—for it requires but little optical aid to divorce the components—that I was not at all surprised on receiving a letter from Mr. Airy, our Astronomer Royal, in which he says: "About seeing ζ Ursæ Majoris with the telescope of Méchain's circle, I can only tell you that I saw it in the beginning of September, 1829, at Milan, and that I made it double perfectly well, but of course rather close, the power of the telescope being low. I did not inquire for Delambre's telescope. I asked for La Caille's sector, but could not hear of it."

ζ Ursæ Majoris is familiarly known as Mízár, which means a waist cloth or apron, a name unknown to the Arabians. Mizar occurs as a proper name in the 42nd Psalm.

Mizar must not be quitted without a notice of Alcor, its more distant companion, usually called the Rider, since it gave rise to the Arabic proverb, applied to one who in searching for a mote overlooks a beam: "Thou canst see Alcor, yet canst not perceive the full Moon." But they are wrong who pronounce the name to be an Arabian word importing sharp-sightedness: it is a supposed corruption of *al-jaún*, a courser, incorrectly written *al-jat*, whence probably the *Alioth* of the Alphonsine Tables came in, and was assigned to ε Ursæ Majoris, the "thill-horse" of Charles's Wain.

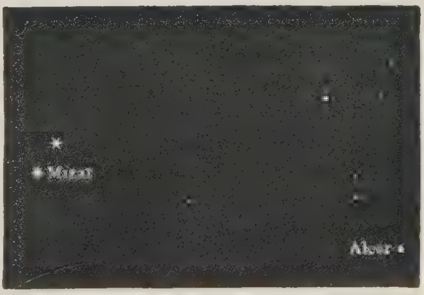

FIG. 28. ζ URSÆ MAJORIS.

From a presumed identity of proper motion, Mizar and Alcor, though upwards of 700″ apart, have been suspected of having a physical connexion, albeit under an *annus magnus* of 190,000 of our years; but this may only prove an additional error. However, to assist a watch upon them, I will add their position and distance from each other, and from a third star—the Sidus Ludovicianum—at a vertex between them, as above shown:

	Position.		Distance.		Epoch.
	°		′ ″		
Mizar and Alcor	71·7	...	11 30	...	1839·32
Mizar and third star	102·6	...	8 45	...	

908. ω CENTAURI. (h. 3504; H. 3531.)

R. A.	13h 20m 10s	Prec. +	3s·55
Decl.	S 46° 44′·3	—— S	18″·85

[illegible]
Dec 47° c

A very large globular cluster. Sir J. Herschel says that "it is visible to the naked eye as a dim, round, cometic object about equal to a star of 4½ mag., though probably if concentrated in a single point the impression on the eye would be much greater. Viewed in a powerful telescope it appears as a globe of fully 20′ in diameter, very gradually increasing in brightness to the centre, and composed of innumerable stars of the 13th and 15th magnitudes, the former probably being two or more of the latter closely juxtaposed."—(*Outlines of Ast.* p. 637.)

Elsewhere Sir John says that this cluster is "beyond all comparison the richest and largest object of the kind in the heavens. The stars are literally innumerable, and as their total light when received by the naked eye affects it hardly more than a star of the 5th or 5·4 magnitude, the minuteness of each may be imagined: it must however be recollected that as the total area over which the stars are diffused is very considerable (not less than ¼ of a square degree), the resultant impression on the sensorium is doubtless thereby much enfeebled, and that the same quantity of light concentred on a single point of the retina would very probably exceed in effect a star of the 3rd magnitude. On a consideration of all the sweeping descriptions [=descriptions noted in "sweeps"], as well as from a great many occasional inspections of this superb object, I incline to attribute the appearance of two sizes of stars of which mention is made to little groups and knots of stars of the smaller size lying so nearly in the same visual line as to run together by the aberrations of the eye and telescope, and not to a real inequality. This explanation of an appearance often noticed in the descriptions of such clusters is corroborated in this instance by the distribution of these apparently larger stars in rings or mesh-like patterns, chiefly about the centre where the stars are most crowded. An attempt has been made to imitate this appearance in the drawing, but partly from the difficulty of its execution, partly from defect of engraving, the plate fails to convey a just idea of it. Two such rings on an oval crossed by a kind of bridge is especially conspicuous in the central part."—(*Cape Obs.*, p. 21.) Engraved, *Cape Obs.*, Pl. v. Fig. 7.

909. 312 (?) Dunlop CENTAURI. (h. 3503; H. 3530.)

	h.	m.	s.			s.
R. A.	**13**	**20**	**13**	Prec.	+	3·81
		°	′			″
Decl.	**S**	**58**	**26·2**	——	S	18·85

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; Ri; l C; st 11;" which means:—"a cluster; rich; little compressed; consists of stars of the 11th magnitude."

910. *u* [94 P. XIII.] HYDRÆ. CCCCLXXXI.

	h.	m.	s.			s.
R. A.	**13**	**23**	**42**	Prec.	+	3·26
		°	′			″
Decl.	**S**	**22**	**42·7**	——	S	18·73

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	94·1	...	138·7	...	1879·28

A variable star [R Hydræ of the Variable Star Catalogues], in the caudine portion of Hydra, with a distant companion: it is about 12° S., a little easterly, from *α* Virginis, in the line towards *α* Canum Venaticorum, and is the third of three equidistant stars, *ψ*, *γ*, and *μ*, on the same parallel. A, at the time of observation, was 5½, pale orange-yellow; B 8, greenish, with a small one *sp* it, near the vertical, both companions being the preceding outliers of a following group. Both the magnitude and colour of the primary here given are liable to the uncertainty created by low altitude, refraction, and vapours. Piazzi remarked it in May, 1805, as "5te magnitudinis, et rubei coloris."

Montanari had called attention to the changes of this star in 1670, and in 1704 Maraldi closely observed it, continuing to examine it at intervals till 1712, when he concluded it variable under a period of about two years. The conditions were investigated by Pigott, who made the time of the star's passing through all its gradations of light and magnitude to be 494 days, by a mean of Maraldi's best observations; but only 487 by his own, under the following conditions:

1. When at its full brightness it is of the 4th magnitude, and has no perceptible change for about a fortnight.
2. It is about 6 months in increasing from the 10th magnitude, and returning to the same.
3. Therefore it may be considered as invisible also during 6 months.
4. It is considerably quicker in increasing than decreasing, perhaps by half.

[The period now assigned to this star is 436 days.]

In several publications this star has been designated *γ* Hydræ, which is the adjacent greenish-yellow star with a minute purple *comes* following by about 11^s. But though γ, from its low altitude, has been variously rated, it has never been indistinct, let alone invisible. Ptolemy marked it δ, or 4; Ulugh Beigh and Hevelius, 3; Flamsteed, 3·4; Mayer, 4; and Piazzi, 4·5. I certainly saw it considerably brighter than its neighbour ψ, which is also rated 4·5 in the Palermo Catalogue.

Mr. Samuel Dunn, of Chelsea, in a paper read to the Royal Society in February, 1762, thinks there may be a gross atmosphere interposed between us and the variable stars: such an ethereal medium he deems sufficient to account for the appearance of new stars and the disappearance of others.

911. 72 VIRGINIS. (Σ. 1750.) CCCCLXXXII.

		h.	m.	s.			s.
R. A.		13	24	41	Prec.	+	3·11
			°	′			″
Decl.	S		5	54·2	——	S	18·77

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	16·1	30·0	1831·53
Burnham	15·6	29·3	1879·34

A very delicate double star, on the right side of Virgo's lower garment; and about 4½° N. by E. of α, just preceding the line produced between that star and α Boötis. A 7½, yellowish white; B 13, violet tint; a third star in the *sp* quadrant. Noted thus by H. in 1785:—"Large white. Small red."

912. 113 P. XIII. URSÆ MAJORIS. CCCCLXXXIII.
(Σ. 1752.)

		h.	m.	s.			s.
R. A.		13	24	51	Prec.	+	2·22
			°	′			″
Decl.	N		60	29·9	——	S	18·70

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	149·4	1·63	1832·17
Stone, O.	143·2	1·42	1879·32

A close double star between the Dragon's and the Bear's tails, 5° N. by E. of ζ Ursæ Majoris, and exactly in midway of ε Ursæ Majoris and α Draconis. A 8½, and B 11, both bluish; with three stars stretching across the S. part of the field, in a line E. and W.; the whole seen during a lively Aurora Borealis. This fine object was discovered by Σ. It is the distant companion of 426 Ursæ Majoris observed by South (= So. 649), who gave Pos. 111·0°; Dist. 181·5″; Epoch 1824·3; but he failed to notice the duplicity of his smaller star.

913. 51 M. CANUM VENATICORUM. CCCCLXXXIV.
(h. 1622; H. 3572; R.)

R. A.	**13ʰ 25ᵐ 13ˢ**	Prec.	+ 2ˢ·54
Decl.	**N 47° 45′·2**	——	S 18″·68

A pair of lucid white nebulæ, each with an apparent nucleus, with their nebulosities running into each other, as if under the influence of a condensing power. They are near the ear of Asterion, the northern hound; and the smaller nebula, or northern one, having the brightest nucleus, was differentiated by the wire micrometer; they are 3° S.W. of η Ursæ Majoris, where the place is indicated by a line from α Ursæ Majoris through δ, extended nearly twice that distance into the S.E. beyond. There are three telescopic stars following, and a bright 7th magnitude about as far beyond them as they are from the nebulæ, but the preceding part of the field is quite clear. Sir J. Herschel has given a very beautiful representation of this extraordinary object, No. 25, in the illustrations to his *Catalogue* of 1830. [But the Earl of Rosse in 1843 failed to identify Herschel's rings, or at least the uniformity which Herschel indicated.]

This fine field was discovered by Messier in 1772, and described as a faint double nebula whose centres are 4′ 35″ apart, but with "the borders in contact." The southern object is truly singular, having a bright centre surrounded with luminosity, resembling a ghost of Saturn, with his ring in a vertical position. H. terms the southern, or halo nebula, a most astonishing object, probably a similar system to our own, the halo representing the Galaxy. "Supposing it," he remarks, "to consist of stars, the appearance it would present to a spectator placed on a planet attendant on one of them, excentrically situated towards the *np* quarter of the central mass, would be exactly similar to that of our Milky Way, traversing, in a manner precisely analogous, the firmament of large stars, into which the central cluster would be seen projected, and (owing to its greater distance) appearing, like it, to consist of stars much smaller than those in other parts of the heavens. Can it then be that we have here a brother-system, bearing a real physical resemblance and strong analogy of structure to our own?"

We have then an object presenting an amazing display of the uncontrollable energies of Omnipotence, the contemplation of which compels reason and admiration to yield to awe. On the outermost verge of telescopic reach we perceive a stellar universe similar to that to which we belong, whose vast amplitudes no doubt are peopled with countless numbers of percipient beings; for those beautiful orbs cannot be considered as mere masses of inert matter. And it is interesting to know that, if there be intelligent existence, an astronomer gazing at our distant universe will see it, with a good telescope, precisely under the lateral aspect which theirs presents to us. But after all what do we see? Both that wonderful universe, our own, and all which optical assistance has revealed to us, may be only the outliers of a cluster immensely more numerous. The millions of suns we perceive cannot comprise the Creator's Universe. There are no bounds to infinitude; and the boldest views of the elder Herschel *only* placed us as commanding a ken whose radius is some 35,000 times longer than the distance of Sirius from us. Well might the dying Laplace exclaim: "That which we know is little; that which we know not is immense.'

[One of the Earl of Rosse's most celebrated "spiral" nebulæ. Huggins finds the spectrum to be non-gaseous. Engraved, *Phil. Trans.*, 1833, Pl. ii. Fig. 25; *Phil. Trans.*, 1850, Pl. xxxv. Fig. 1; Rosse, woodcut, same vol.; Lassell, *Mem. R. A. S.*, vol. xxxvi. Pl. vi. Fig. 27; Rosse, *Dublin Trans.*, 1879, Pl. iv. Fig. 3572.]

914. 252 (?) Dunlop CENTAURI. (h. 3514; H. 3570.)

	h.	m.	s.			s.
R. A.	**13**	**25**	**44**	Prec.	+	4·13
		°	′			″
Decl.	**S**	**65**	**24·5**	——	S	18·67

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; B; p L; c E; b M curved axis; 4 st. involved;" which means:—"a remarkable object; bright; pretty large; considerably extended; brighter in the middle with a curved axis: there are 4 stars involved in the nebula."

915. 127 P. XIII. VIRGINIS. (Σ. 1757.) CCCCLXXXVI.

	h.	m.	s.			s.
R. A.	**13**	**28**	**40**	Prec.	+	3·06
		°	′			″
Decl.	**N**	**0**	**14·9**	——	S	18·57

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	10·0	1·60	1825·37
Smyth	24·1	1·5	1832·39
Smyth	37·9	1·7	1842·52
Struve, O.	48·8	1·85	1850·38
Dawes	54·3	2·31	1860·34
Dembowski	63·5	2·03	1870·15
Doberck	64·2	2·33	1877·23

A close binary star in Virgo's lower garment; it is 11° N. by E. of *α*, just preceding the line between that lucida and *α* Boötis, and close to ζ Virginis, a star of the 4th magnitude. A 8, pale white; B 9, yellowish;

and the two point to a telescopic star at a distance in the *nf* quadrant. A direct angular motion is evident. Period about 240 years.

[The angle is changing less rapidly than it did some years ago. The distance is no doubt increasing, but very slowly.]

916. 5598 Lac. CENTAURI. (*h. 4596.)

	h.	m.	s.			s.
R. A.	**13**	**29**	**42**	Prec.	+	4·07
		°	′			″
Decl.	**S**	**65**	**12·6**	——	S	18·54

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	94·5	1 *est.*	1835·34

A double star. A 8½; B 8½.

917. 135 P. XIII. (f) HYDRÆ.

	h.	m.	s.			s.
R. A.	**13**	**30**	**42**	Prec.	+	3·31
		°	′			″
Decl.	**S**	**25**	**56·0**	——	S	18·50

	Position.	Distance.	Epoch.
	°	″	
SOUTH	192·5	10·3	1825·34
HERSCHEL, J.	191·5	10	1834·71
STONE, O.	192·4	10·1	1879·42

A double star. A 6; B 7.

918. 83 M. CENTAURI. (h. 3523; H. 3606.)

	h.	m.	s.			s.
R. A.	**13**	**30**	**49**	Prec.	+	3·36
		°	′			″
Decl.	**S**	**29**	**18·8**	——	S	18·50

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!(H, h); v B; v L; E 55·1°; esb M N; (L) 3-branched spiral;" which means:—"a very remarkable object; both Sir W. and Sir J. Herschel agree as to this; very bright; very large; extended in the direction of 55·1° with the meridian; extremely suddenly brighter in the middle where there is a nucleus; Lassell notes it to be a 3-branched spiral." Engraved, *Cape Obs.*, Pl. iv. Fig. 5; Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. vii. Fig. 28.

919. 81 VIRGINIS. (Σ. 1763.) CCCCLXXXVII.

	h.	m.	s.			s.
R. A.	13	31	49	Prec.	+	3·13
		°	′			″
Decl.	S	7	18·7	——	S	18·54

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	39·0	2·69	1830·34
Smyth	39·8	2·8	1832·36
Main	42·5	2·78	1862·32
Stone, O.	40·9	2·63	1879·24

A close double star, on the right side of the lower garment, and just 4½° N.N.E. of *a*. A 7½ (rated 6 by Flamsteed), bright white; B 8, yellowish; a minute blue star in the *np* quadrant.

920. 34 ♅. I. VIRGINIS. (h. 1650; H. 3615; ℜ.)

	h.	m.	s.			s.
R. A.	13	32	4	Prec.	+	2·98
		°	′			″
Decl.	N	9	27·2	——	S	18·46

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; E 150°; psb M r N;" which means:—"bright; large; extended in the direction of 150° with the meridian; pretty suddenly brighter in the middle where there is a nucleus which gives indications of being resolveable." Engraved, *Phil. Trans.*, 1861, Pl. xxviii. Fig. 29; Vogel, *Nebelflecken*, 1876, Pl. i. Fig. 11.

921. 297 ♅. II. VIRGINIS. (h. 1649; H. 3614; ℜ.)

	h.	m.	s.			s.
R. A.	13	32	7	Prec.	+	3·23
		°	′			″
Decl.	S	17	19·3	——	S	18·46

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!! (H, h); c F; v L; vg, psmb M L N; (L) 2-branched spiral;" which means:—"a very remarkable object, as to which fact both Sir W. and Sir J. Herschel agree; considerably faint; very large; at first very gradually, then pretty suddenly much brighter in the middle where there is a large nucleus; Lassell found this object to be a 2-branched spiral."

Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 39; Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. vii. Fig. 29.

922. 25 CANUM VENATICORUM. (Σ. 1768.)

	h.	m.	s.			s.
R. A.	**13**	**32**	**34**	Prec.	+	2·68
		°	′			″
Decl.	**N**	**36**	**51·5**	——	S	18·45

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	79·5	...	1·05	...	1829·89
Struve, O.	72·6	...	1·01	...	1841·17
Mädler	56·5	...	0·39	...	1851·29
Dawes	10 or 15	...	0·15	...	1860·36
Dunér	186·0	...	*elongated*	...	1870·43
Schiaparelli	161·4	...	0·42	...	1876·45
Burnham	155·0	...	0·60	...	1880·46

A very close and difficult binary star. A 6, white; B 8, blue. Doberck has assigned a period of 124^{y}.

923. 3341 *H. CAN. VENATICORUM. CCCCLXXXVIII.

	h.	m.	s.			s.
R. A.	**13**	**32**	**47**	Prec.	+	2·78
		°	′			″
Decl.	**N**	**29**	**53·2**	——	S	18·43

	Position.		Distance.		Epoch.
	°		″		
Smyth	191·5	...	1	...	1835·48
Smyth	195·0	...	1	...	1851·37
Burnham	191·2	...	1·83	...	1880·01

A close double star, on the flank of Chara, the southern Hound; lying nearly in mid-distance between α Boötis and α Canum, and a little to the W. of the large cluster, 3 M. A $9\frac{1}{2}$ and B $10\frac{1}{2}$, both white, with a pale blue telescopic companion in the *nf* quadrant. I first noticed this beautiful object while viewing the outliers of that gorgeous mass of stars, 3 M, with Sir J. Herschel, at Slough, in his 20^{ft} reflector; and it is thus entered in his *Catalogue*, No. 1663:

> "Observed with Captain Smyth, who 'saw something remarkable' in a small star 2′ or 3′ preceding the cluster, which proved on closer examination to be a fine first-class double star."

This entry is here copied to show that my telescope, with its $5\frac{9}{10}^{in}$ aperture, had no small task inflicted upon it, to attack an object which had been thus picked up with an instrument of 18^{in} aperture. It accordingly required much attention and coaxing to gain a fair division in its elongation, and the result of my several estimations is drawn from fitful gleams.

924. 156 P. XIII. URSÆ MAJORIS. CCCCLXXXIX.

(Σ. 1770.)

		h.	m.	s.				s.
R. A.		**13**	**33**	**19**	Prec.	+		2·42
			°	′				″
Decl.	**N**		**51**	**16·5**	——		S	18·42

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	120·9	...	1·79	...	1831·80
Dunér	120·1	...	1·7	...	1870·88

A close double star, towards the tip of the Bear's tail. A 6, topaz yellow; B 8, livid, followed within 2^s by a third star similar in lustre with B; and they precede another pair in the *nf* quadrant, probably Piazzi's 157. This exquisite object is one of Σ.'s "aureæ vicinæ."

156 P. is easily found, lying but 2° to the N.N.W. of *η* Ursæ Majoris, in the direction of δ Ursæ Majoris.

925. 638 ℌ. II. CENTAURI. (h. 3526; H. 3620; ℜ.)

		h.	m.	s.				s.
R. A.		**13**	**33**	**41**	Prec.	+		3·39
			°	′				″
Decl.	**S**		**31**	**4·8**	——		S	18·41

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; E 45°±; psmbM;" which means:—"bright; pretty large; extended in the direction of about 45° with the meridian; pretty suddenly much brighter in the middle."

926. 1 BOÖTIS. (Σ. 1772.) CCCCXC.

		h.	m.	s.				s.
R. A.		**13**	**35**	**25**	Prec.	+		2·86
			°	′				″
Decl.	**N**		**20**	**30·6**	——		S	18·34

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	148·7	...	4·84	...	1831·23
Smyth	147·1	...	4·9	...	1832·23
Secchi	144·1	...	4·60	...	1856·93
Flammarion	137·9	...	4·68	...	1877·43

A fine double star, preceding the right shin of Boötes, where it is 8½° preceding *a* on a W. ½ N. line, which prolonged 33° would pass between δ and *θ* Leonis. A 6, sapphire blue; B 10, smalt blue; and this beautiful object is the more remarkable not only in these stars being thus coloured, but in there being two others in the field, one *np* and the other *sp*, which are also bluish.

[The angle seems to be decreasing.]

927. 3529 h. CENTAURI. (H. 3631.)

	h. m. s.	Prec. s.
R. A.	**13 36 18**	+ 3·66
	° ′	″
Decl.	**S 47 36·9**	—— S 18·32

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; vlE; vglb M; 3 st nr;" which means:—"bright; pretty large; very little extended; very gradually less bright in the middle; there are 3 stars near."

928. 3 M. CANUM VENATICORUM. CCCCXCII.

(h. 1663; H. 3636; 𝕽.)

	h. m. s.	Prec. s.
R. A.	**13 37 3**	+ 2·77
	° ′	″
Decl.	**N 28 55·3**	—— S 18·28

A brilliant and beautiful globular congregation of not less than 1000 small stars, between the southern Hound and the knee of Boötes: it blazes splendidly towards the centre, and has outliers in all directions, except the *sf*, where it is so compressed that, with its stragglers, it has something of the figure of the luminous oceanic creature called *Medusa pellucens*. This noble object is situated in a triangle formed by three small stars in the *np*, *nf*, and *sf* quadrants, which, by their comparative brightness, add to the beauty of the field. It is nearly in mid-distance between *a* Boötis and *a* Canum Venaticorum, 11° N.W. of the former.

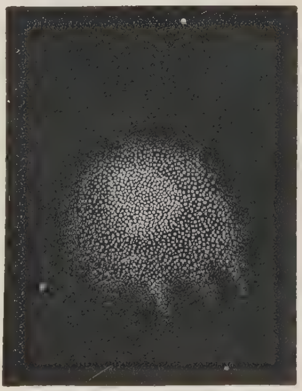

FIG. 29.
3 M. CANUM VENATICORUM.

This mass is one of those balls of compact and wedged stars, whose laws of aggregation it is so impossible to assign; but the rotundity of figure gives full indication of some general attractive bond of union. It was discovered in 1764 by Messier, who described it as "a nebula without a star, brilliant and round:" his instrument must have been rather moderate not to resolve this object, and it is matter of regret that the exertions of such a man were straitened to such means. It was next pronounced to be a "mottled nebulosity;" but in 1784, Sir W. Herschel attacked it with his 20ft reflector, and resolved it into a "beautiful cluster of stars, about 5′ or 6′ in diameter."

929. 98 H. I. BOÖTIS. (h. 1664; H. 3637; R.)

	h.	m.	s.			s.
R. A.	13	37	16	Prec.	+	2·67
		°	′			″
Decl.	N	36	13·1	——	S	18·27

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; R; g, psmb M;" which means:—"considerably bright; pretty large; round; at first gradually, then pretty suddenly much brighter in the middle."

930. 84 VIRGINIS. (Σ. 1777.) CCCCXCIII.

	h.	m.	s.			s.
R. A.	13	37	33	Prec.	+	3·03
		°	′			″
Decl.	N	4	5·8	——	S	18·26

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	227·8	...	3·91	...	1821·37
Smyth	233·4	...	3·5	...	1839·37
Secchi	231·6	...	3·26	...	1857·03
Plummer	230·1	...	3·25	...	1877·51

A close double star, on the tip of Virgo's left wing; it is distant 10½° N. by E. from *a*, and points from that star towards *a* Boötis. A 6, yellowish; B 9, smalt blue; there is a third star of the 9th magnitude in the *sf* quadrant.

The registered observations, previous to my measures, had led to the suspicion of a considerable orbital change, which my own operations did not confirm.

["The colour of B probably changes. A beautiful pair: binary."—*Gledhill.* "Change by no means certain, though there may be a physical connection, from common proper motion."—*Burnham.*]

931. 171 P. XIII. VIRGINIS. (Σ. 1775.) CCCCXCIV.

	h.	m.	s.			s.
R. A.	13	37	49	Prec.	+	3·12
		°	′			″
Decl.	S	3	43·2	——	S	18·26

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	335·6	...	27·7	...	1829·35
Burnham	335·4	...	27·9	...	1878·25

A delicate double star, on the middle of the lower garment; and about 8° N.N.E. of *a*. A [7], light orange-tint; B 10½, pale lilac.

It may be here noticed, that in Sir J. Herschel's observations with the 7ft equatorial he has mistaken the synonyme of the star, which he measured as 171 P. XIII.; that being 1776 of Σ., which is not in Piazzi's Catalogue.

932. 273 Dunlop CENTAURI. (h. 3531; H. 3640.)

		h.	m.	s.			s.
R. A.		13	38	58	Prec.	+	4·13
		°	′				″
Decl.	S	62	20·9		——	S	18·22

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; S; p C; i R; st 10...12;" which means:—"a cluster; bright; small; pretty condensed; irregularly round; the component stars vary from the 10th to the 12th magnitudes."

933. 388 Dunlop CENTAURI. (h. 3533; H. 3642.)

		h.	m.	s.			s.
R. A.		13	39	29	Prec.	+	3·75
		°	′				″
Decl.	S	50	49·2		——	S	18·20

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; p L; R; rrr; st 15;" which means:—"a globular cluster; very bright; pretty large; round; well resolved—clearly seen to consist of stars which are chiefly of the 15th magnitude."

934. 170 H. I. BOÖTIS. (H. 3645.)

		h.	m.	s.			s.
R. A.		13	40	35	Prec.	+	2·56
		°	′				″
Decl.	N	42	17·0		——	S	18·15

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; E 90° ±; b M N;" which means:—"considerably bright; pretty large; extended in the direction of about 90° with the meridian; brighter in the middle where it exhibits a nucleus."

935. 180 ♅. I. BOÖTIS. (h. 1668; H. 3652; 𝕽.)

		h.	m.	s.			s.
R. A.		13	41	57	Prec.	+	2·51
		°	′				″
Decl.	N	44	23·4		——	S	18·16

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; pm E 142°; gb M;" which means:—"considerably bright; large; pretty much extended in the direction of 142° with the meridian; gradually brighter in the middle."

936. 3537 h. CENTAURI. (H. 3654.)

		h.	m.	s.			s.
R. A.		13	42	53	Prec.	+	4·06
		°	′				″
Decl.	S	59	23·8		——	S	18·07

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; v R i;" which means:—"a cluster; very large; very rich."

937. η URSÆ MAJORIS. CCCCXCVI.

		h.	m.	s.			s.
R. A.		13	43	12	Prec.	+	2·38
		°	′				″
Decl.	N	49	51·7		——	S	18·05

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	323·0 ...	29·3 ...	1835·37

A *Nautical Almanac* star, with a distant companion, at the tip of the Greater Bear's tail; and that animal being itself the very corner-stone of alignment, it need only be added, that the worst time for observing η is when the constellation is sub-polar, in autumn, for the tail then, in these latitudes, almost trails along the horizon. A 2½, brilliant white; B 9, dusky.

In Baron De Zach's *Correspondance Astronomique*, vol. viii. p. 516, it is remarked: "M. Struve observe que le P. Piazzi marque dans son dernier Catalogue plusieurs étoiles doubles, qui ne le sont pas, comme, par exemple, l'étoile η de la Grande Ourse." I have myself examined most of the stars to which Piazzi assigns companions, as herein often instanced, and have invariably found him accurate. In the case before us, among the Notæ, Hora XIII., p. 94 and No. 209, are these words: "Duplex. Comes 9^{ae} magnitud. in eodem verticali paullisper ad boream;" and I will venture to assert, that the A and B I have here given thirty-five years afterwards, were as fairly described as the notes to such a meridian Catalogue required.

This star is designated Alkaid, or Benetnasch, both of which are taken from its Arabian denomination, *Al ḳáyid-al benát-al-na'sh*, the governor of the mourners, in allusion to the fancied figure of a bier: the stadtholder of Ideler. It forms a fine termination to the Bear's long tail, which queer appendage is thus accounted for by old Thomas Hood, a Fellow of Trinity College, Cambridge, who wrote on the celestial globe in 1590:

> "*Scholar.* I marvell why (seeing she hath the forme of a beare) her taile should be so long.
>
> "*Master.* Imagine that Jupiter, fearing to come too nigh unto her teeth, layde holde on her tayle, and thereby drewe her up into the heaven; so that shee of herself being very weightie, and the distance from the earth to the heavens very great, there was great likelihood that her taile must stretch. Other reason know I none."

938. 255 ♅. I. DRACONIS. (h. 1674; H. 3662.)

	h.	m.	s.			s.
R. A.	**13**	**43**	**20**	Prec.	+	2·00
		°	′			″
Decl.	**N**	**61**	**32·0**	——	S	18·09

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; m E 57·4°; psb M B E N;" which means:—"bright; pretty large; much extended in the direction of 57·4° with the meridian; pretty suddenly brighter in the middle where there is a bright extended nucleus."

939. 1785 Σ. BOÖTIS.

	h.	m.	s.			s.
R. A.	**13**	**44**	**6**	Prec.	+	2·77
		°	′			″
Decl.	**N.**	**27**	**31·9**	——	S	18·02

	Position.	Distance.	Epoch.
	°	″	
SOUTH	160·4	5·0	1823·40
MÄDLER	172·1	3·4	1840·85
SECCHI	185·9	3·2	1856·36
DEMBOWSKI	197·5	2·5	1869·30
DOBERCK	206·8	2·21	1877·32
JEDRZEJEWICZ	215·4	2·18	1880·46

A binary star. A 7½, white, or yellowish; B 8, bluish.

940. 5700 Lac. CENTAURI.

		h.	m.	s.			s.
R. A.		13	44	59	Prec.	+	3·80
Decl.	S	52°	15′·8		—	S	17″·99

	Position.	Distance.	Epoch.
Herschel, J.	288°·9	18″·2	1837·32

A double star. A 6; B 8.

941. 220 P. XIII. BOÖTIS. CCCCXCVII.

		h.	m.	s.			s.
R. A.		13	45	12	Prec.	+	2·83
Decl.	N	21°	49′·4		—	S	17″·98

	Position.	Distance.	Epoch.
South	208°·2	86″·0	1825·20
Smyth	208·5	85·8	1831·14
Dembowski	208·5	85·8	1873·40

A wide pair of stars, on the right shin of Boötes, 6° W. by N. of α Boötis, in the direction of the lucida of Coma Berenices. A 7½, and B 8, both flushed white, between two stars nearly on the parallel. B is Piazzi's 219.

["Some difference in colour, 1852; yellowish, bluish white? But very little in magnitude, each about 7; 220 rather the larger. In the same field with 6 Boötis, a fine yellow 5th mag. star, marked only 6th mag. on map of S. D. U. K., but very visible to naked eye."—*Webb.*]

942. *k* CENTAURI.

		h.	m.	s.			s.
R. A.		13	45	28	Prec.	+	3·43
Decl.	S	32°	26′·5		—	S	17″·97

	Position.	Distance.	Epoch.
Herschel, J.	112°·7	8″·8	1836·57
Stone, O.	109·1	7·9	1877·42

A double star. A 6; B 7½.

943. 256 ♅. I. DRACONIS. (h. 1684: H. 3671; ℞.)

		h.	m.	s.			s.
R. A.		13	45	33	Prec.	+	2·01
Decl.	N	60°	44′·8		—	S	17″·96

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"v B; p L; i R; psmb M;" which means:—"very bright; pretty large; irregularly round; pretty suddenly much brighter in the middle."

944. 282 Dunlop CENTAURI. (h. 3542; H. 3666.)

	h.	m.	s.			s.
R. A.	**13**	**46**	**11**	Prec.	+	4·15
		°	′			″
Decl.	**S 61**		**18·6**	——	S	17·94

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p C; st 11;" which means:—"a cluster; pretty large; pretty condensed; the component stars are chiefly of the 11th magnitude."

945. h CENTAURI.

	h.	m.	s.			s.
R. A.	**13**	**46**	**52**	Prec.	+	3·42
		°	′			″
Decl.	**S 31**		**23·5**	——	S	17·91

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	185·6	13·7	1837·47

A double star. A 6; B 9. Or $5\frac{1}{2}$; $7\frac{1}{2}$, according to Gould. About 20′ N. of this object is a fine pair discovered by Burnham in 1875 (= β 343). O. Stone gives:—Pos. 130·2°; Dist. 1·37″; Epoch 1877·41. Mags. 6 and $8\frac{1}{2}$. This star is 219 Centauri.

946. 238 P. XIII. VIRGINIS. (Σ. 1788.) CCCCXCVIII.

	h.	m.	s.			s.
R. A.	**13**	**49**	**12**	Prec.	+	3·14
		°	′			″
Decl.	**S 7**		**31·1**	——	S	17·82

	Position.	Distance.	Epoch.
	°	″	
South	51·7	2·76	1825·39
Smyth	55·0	2·5	1834·29
Secchi	62·6	2·46	1856·39
Doberck	67·5	2·68	1877·31
Stone, O.	69·5	2·62	1878·92

A close double star, nearly in the middle of the lower garment. A ray from α Corvi to the E.N.E., through α Virginis, and prolonged 8° beyond that star, catches it up; or another from β in the Lion's tail, passed close under δ Virginis, and carried as far again into the S.E., also hits it. A 7, and B $8\frac{1}{2}$, both white, and they are preceded by two small dusky stars, one in the *sp* quadrant, and the other in the *np*.

[The angle is evidently increasing.]

947. 6 H̥. I. VIRGINIS. (h. 1703; H. 3702; 𝕽.)

R. A.	$13^{h}\ 50^{m}\ 35^{s}$	Prec. +	$3^{s}{\cdot}01$
Decl.	N $5^{\circ}\ 47'{\cdot}6$	—— S	$17''{\cdot}77$

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; R; psb M; * 8 nf;" which means:—"bright; pretty large; round; pretty suddenly brighter in the middle; there is an 8th mag. star in the *nf* quadrant."

948. 3548 h. CENTAURI. (H. 3706.)

R. A.	$13^{h}\ 51^{m}\ 8^{s}$	Prec. +	$3^{s}{\cdot}58$
Decl.	S $39^{\circ}\ 26'{\cdot}6$	—— S	$17''{\cdot}75$

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; v B; v L; vl, vsmb M ⁑;" which means:—"a remarkable object; very bright; very large; at first very little, then very suddenly much brighter in the middle where there is a double star." Engraved, *Cape Obs.*, Pl. vi. Fig. 10.

949. 187 H̥. I. CANUM VENATICORUM. D.
(h. 1712; H. 3716; 𝕽.)

R. A.	$13^{h}\ 51^{m}\ 54^{s}$	Prec. +	$2^{s}{\cdot}39$
Decl.	N $47^{\circ}\ 47'{\cdot}3$	—— S	$17''{\cdot}71$

A small round nebula, of an oval shape and pale-white tint, preceding the right arm of Boötes. Its major-axis trends *sp* and *nf*, and there are several small stars in the field, of which three form a triangle near the N. vertical. It lies a couple of degrees to the S.S.E. of η Ursæ Majoris, in the direction of γ on the right shoulder of Boötes.

950. 240 H̥. I. DRACONIS. (h. 1719; H. 3726.)

R. A.	$13^{h}\ 52^{m}\ 29^{s}$	Prec. +	$1^{s}{\cdot}97$
Decl.	N $60^{\circ}\ 17'{\cdot}7$	—— S	$17''{\cdot}69$

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; p L; E; mb M N;" which means:—"pretty bright; pretty large; extended; much brighter in the middle where there is a nucleus."

951. 181 H. I. BOÖTIS. (h. 1717; H. 3723.)

	h. m. s.		s.
R. A.	13 52 32	Prec. +	2·49
Decl.	N 42° 22′·8	—— S	17″·68

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c L; R; gb M;" which means:—"considerably bright; considerably large; round; gradually brighter in the middle."

952. 51 B. BOÖTIS. (Σ. 1793.)

	h. m. s.		s.
R. A.	13 54 2	Prec. +	2·76
Decl.	N 26° 21′·3	—— S	17″·62

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	242·2	...	4·4	...	1831·08
Dunér	242·5	...	4·5	...	1871·93

A double star. A 7½, white; B 8½, bluish. Components evidently fixed.

953. 277 P. XIII. URSÆ MAJORIS. (Σ. 1795.) DI.

	h. m. s.		s.
R. A.	13 54 53	Prec. +	2·20
Decl.	N 53° 38′·5	—— S	17″·59

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	3·2	...	7·6	...	1832·13
Smyth	4·9	...	7·0	...	1835·36
Burnham	2·8	...	7·6	...	1879·26

A neat but very delicate double star, between the Bear's tail and the right hand of Boötes. A 7½, bright white; B 12, pale blue, and, for its magnitude, singularly distinct, hence forming a fine test object.

This object is easily fished up by alignment, since it is but 4° N.N.E. of η Ursæ Majoris, and in the line with ζ, ε, and δ Ursæ Majoris.

954. 101 M. BOÖTIS. (h 1744; H. 3770; R.) DIII.

	h. m. s.		s.
R. A.	13 59 17	Prec. +	2·13
Decl.	N 52° 53′·8	—— S	17″·40

A pale white nebula, in the nebulous field *np* the right hand of Boötes;

it is 5° N.N.E. of η Ursæ Majoris, and a similar distance E. half S. from ζ. This object was discovered by Méchain in 1781, in whose instrument it was very obscure; and it only exhibited a mottled nebulosity to ♅. Under a favourable view it is large and well spread though somewhat faint except towards the centre, where it brightens. There are several telescopic stars in the field, one of which is very close to the nebula.

From the nature of this neighbourhood, and a trifling uncertainty in the earlier data, this object may be 214 ♅. I. It is one of those globular nebulæ that seem to be caused by a vast agglomeration of stars, rather than by a mass of diffused luminous matter; and though the idea of too dense a crowd may intrude, yet the paleness tells of its inconceivable distance and probable discreteness.

["Very large but very faint."—*Brodie.* "Large, spiral, faintish; several arms and knots; 14′ across at least."—*Parsonstown Obs.* Engraved, *Phil. Trans.* 1861, Pl. xxix. Fig. 35.]

955. — CENTAURI. (*h. 4649.)

	h.	m.	s.			s.
R. A.	**14**	**1**	**18**	Prec.	+	4·15
		°	′			″
Decl.	**S**	**59**	**11·9**	——	S	17·31

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	69·4	...	11 *est.*	...	1835·34

A double star. A $8\frac{1}{2}$; B $8\frac{1}{2}$. "Both stars are of a full scarlet colour. Two small stars *sp* and a large one preceding are white. A very interesting and remarkable object." Sir J. Herschel, whose words have just been quoted, adds that as measures separated by two years, each of them the means of 3 measures, show an increase in the angle of 5′, "there can be very little doubt of a rotatory movement."

956. α DRACONIS. **DIV.**

	h.	m.	s.			s.
R. A.	**14**	**1**	**24**	Prec.	+	1·63
		°	′			″
Decl.	**N**	**64**	**54·1**	——	S	17·31

	Position.		Difference of R. A.		Epoch.
	°		s.		
Smyth	45·8	...	23·9	...	1834·41

A bright star with a distant companion, in the middle of Draco's body.

A 3½, pale yellow; B 8, dusky; two other telescopic stars in the following part of the field. The primary is suspected of variability, for Ptolemy, Ulugh Beigh, and La Caille mark it as of 3rd magnitude; and Pigott as a bright 4th; Tycho Brahé, Hevelius, and Bradley rank it of the 2nd; and though marked of the latter size in the *British Catalogue*, Baily found that in the original entries it is designated once of the 3rd and once of the 4th. I have had it in view many times, and always looking like a small 3rd; though Baron De Zach, but shortly before, classed it 2·3.

This star, though not the *lucida* of the asterism, unless we admit its variability, has been lettered α, and was once rated of the 2nd magnitude: it is named Thuban, from the Arabian *al-Thu'bán*, the dragon. Upwards of 4600 years ago it was the pole-star of the Chaldeans, being then within 10′ of the polar point; a point which will not be approached by α Ursæ Minoris nearer than 26′ 30″. α Draconis, in that remote age, must have seemed stationary during the apparent revolution of the celestial sphere about the northern extremity of the polar axis; though now it has, by the slow movement to which the stellar host is subject, deviated from the pole nearly 25°.

Δράκων, Draco, is figured as a strange bird-headed reptile meandering around the N. pole of the ecliptic, passing its tail between the two Bears and its head under the right foot of Hercules, and extending over so many hours of R.A. as to be quite confusing. Virgil and other old writers constantly place the constellation between the two Bears; which location hardly suits its present place, since the principal stars are between Ursa Minor, Cepheus, Cygnus, and Hercules. In a rare volume, printed at Venice, *anno salutifere incarnationis* 1448, an edition which escaped the industrious gleaning of La Lande, are some very taking figures of the constellations, and among others the two Bears are regularly enfolded in the embrace of Draco; while Virgil, *viâ* Dryden, says:

> Around our Poles the spiry Dragon glides,
> And like a wand'ring stream the Bears divides.

This extensive and convoluted *Maximus Anguis* was, however, one of the original 48 asterisms, and has thus gradually increased its components, as practical optics have advanced:

Ptolemy . . .	31 stars.	Hevelius . . .	40 stars.
Tycho Brahé . .	32 „	Flamsteed . . .	80 „
Bayer	33 „	Bode	255 „

An imaginary line projected northward from Cor Caroli through ζ Ursæ Majoris passes by Thuban; or it may be looked for about midway between ζ Ursæ Majoris and γ Ursæ Minoris.

957. 431 Dunlop CENTAURI. (h. 3555; H. 3772.)

	h.	m.	s.			s.
R. A.	14	1	34	Prec.	+	3·80
		°	′			″
Decl.	S	47	47·5	——	S	17·35

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; vl C; st 8;" which means:—"a cluster; very large; very little condensed; it comprises stars of the 8th magnitude."

958. κ BOÖTIS. (Σ. 1821.) DV.

	h.	m.	s.			s.
R. A.	14	9	31	Prec.	+	2·15
		°	′			″
Decl.	N	52	18·1	——	S	16·94

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	240·0	12·5	1779·74
STRUVE, W.	237·7	12·4	1828·77
MÄDLER	236·1	12·4	1855·37
DUNÉR	236·3	12·9	1872·90
JEDRZEJEWICZ	236·7	12·9	1879·68

A neat double star in the herdsman's right hand, where, with θ and ι, and λ on the upper arm, it forms *Aulád al-dhiba'*, the young of the hyæna. A 5½, pale white; B 8, bluish. This is a fine object.

κ Boötis may be discerned as forming the N.W. point of a little triangle with its own ι and θ; or carrying a line from ε Ursæ Majoris through ζ, the two inner stars of the tail, and 6° further to the E., will show it.

959. α BOÖTIS. DVI.

	h.	m.	s.			s.
R. A.	14	10	39	Prec.	+	2·81
		°	′			″
Decl.	N	19	45·7	——	S	16·89

	Position.	Difference of R. A.	Epoch.
	°	s.	
SMYTH	49·3	15·1	1835·47
BURNHAM	44·7	*not stated*	1879·25

Arcturus, a *Nautical Almanac* star, between the legs of Boötes, with a distant companion in the *nf* quadrant. A 1, reddish yellow; B 11, lilac; and at the extreme verge of the field, under moderate magnifying power, is the star *infra Arcturum*, noticed by Flamsteed on the 14th of February, 1690, then *preceding* the primary, but now, from the large proper motions of Arcturus, *following* it. These motions have been well watched, and the best registers of their quantity and direction give the following values: in R.A. −1·18″; in Decl. −1·96″ (Argelander).

Mayer of Mannheim, who had some odd notions in astrognosy, considered Arcturus as a cluster; in the which he was mistaken. Various crotchets have been started respecting its insulation, while from its brilliance and proper motions a conclusion was drawn that it was the nearest star to our system, but this has been abandoned since the still greater motion of 61 Cygni, μ Cassiopeiæ, and other stars, has been ascertained. Dr. Hornsby pronounced upon its proximity, because the variation of its place seemed more remarkable than that of any other of the stars; and by comparing a variety of observations respecting its motions, he inferred that the obliquity of the ecliptic decreases at the rate of 58″ in one hundred years; a quantity, he observes, "which will be found nearly at a mean of the computations framed by Mr. Euler and M. de la Lande, upon the principles of attraction." Sanguine hopes of arriving at its distance were entertained, but every exertion met with disappointment; and Piazzi dismissed the case thus: "Pluries inquisivimus in hujus stellæ parallaxim, sed nihil profecimus." The star has, however, been extensively useful in modern astronomy; and it is remarkable as being the body by which the fine discovery was made, that stars and planets may be advantageously observed during the Sun's presence. The Abbé Picard imagined himself to be the discoverer of the feasibility of so doing, from observing the meridional altitude of this star on the 13th of July, 1669, while the sun was elevated 17°; but he who observes should also read, or he may "make many inventions," for the fact of the principal stars being visible in broad day-light had been announced by the enthusiastic M. Morin, in 1635, and, curiously enough, his first star was also Arcturus.

Arcturus is compounded of ἄρκτου, and οὐρὰ, bear's tail, from its proximity to the latter, being somewhat in a direction pointed by a line drawn through the two hinder stars, ζ and η, of the tail. Being one of the most brilliant of the stellar bodies, it was noticed by very early star-gazers; but though, as I have said under η Tauri, the name is dragged into our translation of Job as a synonyme of *'Aïsh*, it must be inferred that the Seventy wished rather to express a brilliant emblem of Majesty, than to be critically exact: like the exclamation of Job, "Oh that my words were *printed* in a book!" It is first mentioned by Hesiod, whose æra is nearly approximated by the passage in the *Works and Days*, in which the star is mentioned. From this passage it appears that there is a difference of 40 days in the achronical rising of that *lucida*, since the time of the poet; whence, by allowing 50¼″ annually as the recession of the equinoxes, we obtain about 2850 years since the days of Hesiod.

Aratus—of course from Eudoxus—and Hyginus place Arcturus in the herdsman's girdle: "In zona una clarius cæteris lucente, hæc stella Arcturus appellatur;" but it is now usually marked between the calves of his legs, or as others have it, *in fimbriâ*, and on the "skirts of his coat." Vitruvius, lib. ix., expressly says of it, "stella media genuorum custodis Arcti." The Arabians call it *Simák-al-râmiḥ*, the prop or leg of the lancer, but the true meaning of *simák* is very uncertain, as was noticed under α Virginis, the other *simák*. Ulugh Beigh, in his Catalogue, places Arcturus "extra hanc figuram," expressly noting its position, "inter femora figuræ:" whence probably R. Recorde, in 1556, derived his description, "Boötes hath 22 starres, beside one very bryghte starre called Arcturus, which standeth between Boötes his legges." From the days of Evander it was a noted star among ancient mariners, but its influences were reckoned ungenial; and the change between the summer and autumnal Etesian winds, being preceded by eight or ten days of squally weather, the *prodromi* of old, they were ascribed to the direct power of Arcturus, instead of the alteration consequent upon the solar march. We learn from Demosthenes that a sum of money was lent at Athens on bottomry, on a vessel going to the Crimea and back, at 22½ per cent. on the voyage out and home; but unless they returned before the rising of Arcturus, 30 per cent. was to be paid. Virgil repeatedly spurns this paranatellon of Virgo, as a cold star; while Horace shows that a contented man is neither anxious about the tempestuous sea, nor the malign aspects of stars, thus:

> Nec sævus Arcturi cadentis
> Impetus, aut orientis Hædi.

Arcturus opens the *Rudens* of Plautus in person, by delivering the prologue; and the act is curious, inasmuch as it is one of the early opinions of the presence of invisible agents amongst mankind. This fine introduction has long been admired for its train of beautiful and religious sentiments; while Bonnel Thornton's English version of it may be cited as one of the very rare instances of a translation even exceeding the original.

To pick up Arcturus by alignment is very easy. A ray from the Pole-star through η Ursæ Majoris, the first horse of the wain, and carried about 30° beyond it to the southward, will pass α Boötis; which bright object may be further identified by forming an equilateral triangle with α Virginis and α Cygni. Arcturus and Polaris also make nearly a right angle with α Lyræ; whence the galley rhymes:

> From staid Polaris cast a glance, to beauteous Lyra's lines,
> 'Twill guide, rectangular from these, to where Arcturus shines:
> Or lead a line from two bright stars, in Ursa's tail the last,
> The same prolonged thrice ten degrees, will on that gem be cast.

Boötes is one of the old 48 constellations, and the name appears to be from βοῦς, an ox, alluding to the herdsman; but the ancients as frequently called it *Arctophylax*, or bear-keeper. Aratus designates it by both names, as shown by his translators, Cicero and Festus Avienus; while Germanicus, in common with several others, called it Icarus, and the translators of Ptolemy rendered it Vociferator. The asterism is usually figured as a robust man walking, with one hand upraised, and the other holding a club, spear, pastoral staff (*pedum*), or sickle (*merga*), for he is represented at various epochs with each of these symbols. The attitude, especially in early representations, well countenanced the title of *Clamator;* but Hevelius having introduced the two hounds in 1690, they were given as attributes to Boötes, and the cords which held them passed into his upraised hand. The figure was adopted from elsewhere by the Greeks, no doubt, since they give no certain account of its origin; their stories making a yaw between Icarius, the father of Virgo of the zodiac, and the farming son of Calisto. Those who considered Ursa as an animal dubbed Boötes the bear-keeper; but numbers who saw in the disposition of those stars a waggon, or wain, made him the driver. Hence Claudian's

> Boötes with his Wain the north unfolds;
> The southern gate Orion holds.

Among the several offices assigned him, however, the majority are for that of herdsman.

This constellation has some remarkable stars besides Arcturus, though of inferior brilliance; and Izár (ε Boötis) was a great favourite, ages before its beauty and delicacy had been revealed to man by the telescope. The components have been thus successively enumerated in the best Catalogues:

Ptolemy . . .	23 stars.	Bullialdus . . .	29 stars.
Tycho Brahé . .	28 ,,	Hevelius	52 ,,
Kepler . . .	29 ,,	Flamsteed . . .	54 ,,
Bayer	34 ,,	Bode	319 ,,

Of these upwards of 30 are double stars, some exceedingly fine and interesting; and there are several clusters, and fully 100 nebulæ, of various classes. So that Boötes is a truly rich asterism.

960. 418 ♅. II. BOÖTIS. (h. 1766; H. 3826; ℞.) DVII.

	h.	m.	s.		s.
R. A.	14	11	25	Prec. +	2·52
	°	′			″
Decl. N	35	51·7		—— S	16·85

A faint nebula preceding the right side of Boötes. This object is small, round, and pale, but perfectly distinct. It has a nucleus, or at least is brightest at the centre, and its edges are so attenuated as to give it the appearance of a star in a burr. It is attended by a coarse group of small stars in the *nf* quadrant, followed by a conspicuous one of the 6·7 magnitude. Uniting *α* Canum Venaticorum to *α* Boötis as the base of a triangle, the spot now treated of will form the N.E. apex, at an equal distance, 16° from each.

["Very faint and very small in 8½in refractor." *Brodie.*]

961. 121 B. BOÖTIS. (Σ. 1825.)

	h.	m.	s.			s.
R. A.	14	11	27	Prec.	+	2·80
	°	′				″
Decl. N	20	38·1		——	S	16·84

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	185·7	...	3·4	...	1830·66
Mädler	184·5	...	4·0	...	1841·52
Secchi	182·2	...	3·7	...	1857·77
Dembowski	178·8	...	3·9	...	1864·5
Doberck	174·7	...	4·0	...	1877·39

A double star. A 7½, white; B 9, white. A diminution of angle seems certain, and an increase of distance probable. 1° N. of and a little *f* *α* Boötis.

962. 3563 h. CENTAURI. (H. 3823.)

	h.	m.	s.			s.
R. A.	14	11	34	Prec.	+	3·74
	°	′				″
Decl. S	42	52·0		——	S	16·85

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; v F; pm E; esvmb M * 12;" which means:—"a remarkable object; very faint; pretty much extended; it becomes extremely suddenly very much brighter in the middle where there is a 12th mag. star."

963. *ι* BOÖTIS. (Σ. 3124 rej.; Σ. 26 App. I.) DVIII.

	h.	m.	s.			s.
R. A.	14	12	17	Prec.	+	2·14
	°	′				″
Decl. N	51	52·5		——	S	16·81

	Position.		Distance.		Epoch.
	°		″		
Struve	33·9	...	38·06	...	1836·28
Main	33·9	...	37·7	...	1865·76
Jedrzejewicz	33·6	...	38·5	...	1877·60

A double star, in the herdsman's right hand. A 4½, pale yellow;

B 8, creamy white; and they will be picked up by the alignment already given at κ, being the southern vertex of the triangle there mentioned. Σ. suspected A to be a close double.

[Dunér states that the notion of A being double must be abandoned, and that O. Struve concurs in this! Yet Smyth after the "stimulus" he received from Poulkova in 1837 saw the companion! Wilson in 1874 "fancied" he saw A B elongated in the direction 55°.]

964. 99 ♅ I. BOÖTIS. (h. 1776; H. 3843; 𝕽.) DIX.

		h.	m.	s.			s.
R. A.		14	13	50	Prec.	+	2·52
		°	′				″
Decl.	N	37	0·5		——	S	16·73

A white round nebula, preceding the right shoulder of Boötes. It is very pale except in the centre, and is amidst some scattered telescopic stars, of which the closest is one of the 10th magnitude *np.* It lies 10° to the N.N.W. of ϵ Boötis, in the direction of η Ursæ Majoris, at the tip of the Bear's tail.

965. 5893 Lac. (y) CENTAURI.

		h.	m.	s.			s.
R. A.		14	14	44	Prec.	+	4·21
		°	′				″
Decl.	S	57	57·0		——	S	16·69

		Position.		Distance.		Epoch.
Herschel, J.	A B	163°·2	...	9″·6	...	1836·65
	A C	1·6	...	35 *est.*		

A triple star. A 6; B 8½; C 11.

966. 144 ♅. I. VIRGINIS. (h. 1779; H. 3846; 𝕽.)

		h.	m.	s.			s.
R. A.		14	14	45	Prec.	+	3·01
		°	′				″
Decl.	N	4	26·5		——	S	16·69

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; R; psbM; r; *12nf;" which means:—"bright; pretty large; round; pretty suddenly brighter in the middle; hardly resolveable; there is a 12th mag. star in the *nf* quadrant."

967. 146 H. I. VIRGINIS. (h. 1783; H. 3851; R.)

		h. m. s.			s.
R. A.		14 15 31	Prec.	+	3·02
		° ′			″
Decl.	N	3 46·5	——	S	16·68

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; R; vsmb M; f of 2;" which means:—"bright; small; round; very suddenly much brighter in the middle; the following of two nebulæ." The other nebula here mentioned (=145 H. I.; h. 1782; H. 3850) is described as:—"p F; p S; l E;" which means:—"pretty faint; pretty small; little extended."

968. 62 P. XIV. LIBRÆ. (Σ. 1833.) DX.

		h. m. s.			s.
R. A.		14 16 49	Prec.	+	3·16
		° ′			″
Decl.	S	7 15·5	——	S	16·59

	Position.	Distance.	Epoch.
	°	″	
Smyth	166·8 ...	5·2 ...	1836·44
Dunér	167·4 ...	5·2 ...	1872·35
Stone, O.	168·2 ...	5·4 ...	1879·17

A fine double star, in a strange boundary nook of Libra, but on Virgo's garment, 15° E. by N. of α Virginis. A and B, both 8th magnitude, and both silvery white; a line led through them into the *np* quadrant leads close to an ash-coloured telescopic star. This is an easy object, which bears illumination well, and is of considerable brightness. Their relative fixity is established, but there is a sensible proper motion brought home to A, which in time will prove whether it is in connexion with B or not.

[2½° *sf* ι Virginis.]

969. 69 P. XIV. BOÖTIS. (Σ. 1835.) DXI.

		h. m. s.			s.
R. A.		14 17 58	Prec.	+	2·95
		° ′			″
Decl.	N	8 56·9	——	S	16·53

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	186·0 ...	6·2 ...	1825·40
Smyth	186·2 ...	6·3 ...	1835·44
Dunér	187·7 ...	6·0 ...	1869·41

A very neat double star, on Mons Mænalus, between the left foot of Boötes and Virgo; it is 11° S. ½ E. from α Boötis, and on the line between α Virginis and ζ Boötis. A 6, flushed white; B 7½, smalt blue.

This pretty pair was first classed by Piazzi: "Duplex. Comes 8·9^{ae} magn. et in eodem verticali." Here that excellent astronomer has certainly under-rated the brightness of the companion, unless it be variable; the observations prove its fixity.

970. 357 Dunlop CENTAURI. (h. 3566; H. 3862.)

		h.	m.	s.			s.
R. A.		**14**	**18**	**16**	Prec.	+	4·12
		°	′				″
Decl.	**S**	**54**	**18·1**		——	S	16·53

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vl Ri; vl C; st 10;" which means:—"a cluster; not very rich; very little condensed; the stars are chiefly of the 10th magnitude."

971. 70 P. XIV. LIBRÆ. (Σ. 1837.) DXII.

		h.	m.	s.			s.
R. A.		**14**	**18**	**46**	Prec.	+	3·21
		°	′				″
Decl.	**S**	**11**	**10·1**		——	S	16·49

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	326·8	...	1·41	...	1829·83
SMYTH	325·8	...	1·6	...	1833·36
MÄDLER	323·4	...	1·55	...	1848·38
SPÖRER	309·8	...	1·26	...	1875·87
STONE, O.	306·8	...	1·36	...	1879·35

A close double star, in the precincts of Libra, but hard upon Virgo's right heel: it is 15° E. of α Virginis, where it is preceded by a star of the 6th magnitude. A 7½, pale yellow; B 9½, greenish. This is a very beautiful but difficult object.

972. 302 Dunlop CENTAURI. (h. 3570; H. 3885.)

		h.	m.	s.			s.
R. A.		**14**	**21**	**35**	Prec.	+	4·42
		°	′				″
Decl.	**S**	**60**	**13·5**		——	S	16·35

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; p Ri; p C M; st 8;" which means:—"a cluster; large; pretty rich; pretty condensed in the middle; there are some 8th mag. stars in it."

973. φ VIRGINIS. (Σ. 1846.) DXIII.

R. A.	14h 22m 32s	Prec. +	3s·09
Decl.	S 1° 44′·0	——	S 16″·30

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	108·3	3·73	1829·74
Wilson, etc.	115·7	3·7	1874·41
Stone, O.	108·5	4·1	1878·73

A most delicate double star in the *nf* corner of Virgo's skirt: it will be found about 18° N.E. by E. of α Virginis, where it is the apex of a triangle of which α and β Libræ form the base. A 5, pale yellow; B 13, fine blue.

This star forms a kind of vertical curve with ι and κ, and is the skirt of the garment.

974. 1850 Σ. BOÖTIS.

R. A.	14h 23m 42s	Prec. +	2s·64
Decl.	N 28° 46′·7	——	S 16″·24

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	262·2	25·6	1832·00
Dawes	262·2	25·4	1851·52
Main	263·2	25·2	1864·31

A double star. A 6½, very white; B 7, very white.

975. 70 H. I. VIRGINIS. (h. 1813; H. 3900; R.) DXIV.

R. A.	14h 23m 50s	Prec. +	3s·14
Decl.	S 5° 28′·7	——	S 16″·24

A pale white nebula, over Virgo's left ancle, in a line between a 9th magnitude star in the *sf* quadrant and an 11th a little nearer in the *np*; it is 4° S. and a little E. of φ Virginis. This object though small is very distinct, and its *candied* aspect betokens a wonderfully remote globular cluster. Indeed the powerful instrument of H. resolved it; and he described it as being composed of stars of the 19th magnitude. So that here we find another universe in the plenitude of space!

976. 95 P. XIV. VIRGINIS. (Σ. 1852 rej.) DXV.

	h.	m.	s.			s.
R. A.	14	24	17	Prec.	+	3·12
Decl.	S 3°	45′·2		——	S	16″·21

	Position.		Distance.		Epoch.
BURNHAM	267°·9	...	24″·8	...	1879·32

A wide double star, on the lower left side of Virgo's skirt, where a ray from *α* Virginis, carried about 18° into the E.N.E., will pick it up a little to the S. of *ϕ*. A 7½, and B [10], both bluish. Σ. entered this upon his list, but did not measure it. The small star is best seen on averting the eye to another part of the field.

977. 469 Dunlop CENTAURI. (h. 3572; H. 3909.)

	h.	m.	s.			s.
R. A.	14	25	34	Prec.	+	3·82
Decl.	S 43°	42′·6		——	S	16″·14

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"p B; L; R; vglb M; st inv;" which means:—"pretty bright; large; round; very gradually less bright in the middle; there are stars involved in the nebula."

978. 5 URSÆ MINORIS. DXVI.

	h.	m.	s.			s.
R. A.	14	27	43	Prec.	—	0·27
Decl.	N 76°	11′·2		——	S	16″·03

	Position.		Distance.		Epoch.
BURNHAM	129°·4	...	56″·4	...	1879·30

A wide double star, under the Lesser Bear. A 4, fine yellow; B 11, plum colour; and the two point precisely to a distant telescopic star in the *sf* quadrant: it may easily be found, since a ray through the Guards, carried about two-thirds as far again into the N.W., will reach it.

979. 237 ♅. I. DRACONIS. (h. 1843; H. 3934; 𝕽.)

		h. / °	m. / ′	s.			s. / ″
R. A.		14	28	43	Prec.	+	1·76
Decl.	N	58	24·2		——	S	15·99

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L: l E 0°; vgmb M;" which means:—"bright; large; a little extended in the direction of the meridian; very gradually much brighter in the middle."

980. 189 ♅. I. BOÖTIS. (h. 1842; H. 3935; 𝕽.)

		h. / °	m. / ′	s.			s. / ″
R. A.		14	28	54	Prec.	+	2·11
Decl.	N	49	56·8		——	S	15·97

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; E 45° ±; pgb M; r;" which means:—"bright; large; extended in the direction of about 45° with the meridian; pretty gradually brighter in the middle; hardly resolveable—mottled as if with stars."

981. α CENTAURI.

		h. / °	m. / ′	s.			s. / ″
R. A.		14	32	7	Prec.	+	4·00
Decl.	S	60	23·0		——	S	15·79

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	219·6	...	16·5	...	1836·27
SANTIAGO OBS.	280·5	...	7·6	...	1851·28

A *Nautical Almanac* and double star. A 1, yellow; B 2, yellow; both stars being nearly of the same shade of yellow. Gould puts the magnitude of B at 3½.

982. α CIRCINI.

		h. / °	m. / ′	s.			s. / ″
R. A.		14	33	37	Prec.	+	4·79
Decl.	S	64	29·6		——	S	15·72

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	243·8	...	15·6	...	1837·08

A double star. A 4, white; B 8½, yellow.

983. 182 ℌ. I. VIRGINIS. (h. 1857; H. 3964; 𝔎.)

		h.	m.	s.			s.
R. A.		14	34	32	Prec.	+	3·07
		°	′				″
Decl.	N	0	11·4		——	S	15·67

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; p L; R; psmb M; r;" which means:—"considerably bright; pretty large; round; pretty suddenly much brighter in the middle; hardly resolveable—mottled."

984. 333 Dunlop CENTAURI. (h. 3577; H. 3966.)

		h.	m.	s.			s.
R. A.		14	35	25	Prec.	+	4·35
		°	′				″
Decl.	S	57	4·6		——	S	15·62

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; p Ri; C M; st 11 . . . 13;" which means:—"a cluster; large; pretty rich; condensed in the middle; the stars vary from the 11th to the 13th magnitudes."

985. π BOÖTIS. (Σ. 1864.) DXVII.

		h.	m.	s.			s.
R. A.		14	35	33	Prec.	+	2·81
		°	′				″
Decl.	N	16	53·5		——	S	15·61

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	96·5	...	6·17	...	1779·72
HERSCHEL, J., and SOUTH	97·9	...	6·90	...	1822·05
STRUVE, W.	99·2	...	5·8	...	1830·30
MÄDLER	101·0	...	6·01	...	1852·36
ROMBERG	101·8	...	6·01	...	1863·27
DOBERCK	101·0	...	6·16	...	1877·31
JEDRZEJEWICZ	102·3	...	5·96	...	1880·46

A neat double star, on the herdsman's left leg, being one of four bright stars in that limb, and the nearest to *a*, lying E.S.E. of that splendid gem, 7° distant. A $3\frac{1}{2}$, and B 6, both white. This is a fine object.

[The above measures seem to imply a movement in angle.]

986. ζ BOÖTIS. (Σ. 1865.) DXVIII.

	h.	m.	s.			s.
R. A.	**14**	**35**	**53**	Prec.	+	2·85
		°	′			″
Decl.	**N**	**14**	**12·1**	——	S	15·59

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	129·3	...	1·19	...	1830·47
Smyth	127·3	...	1·2	...	1842·43
Fletcher	305·8	...	1·1	...	1851·75
Struve, O.	304·0	...	1·00	...	1861·12
Doberck	300·6	...	0·88	...	1877·33
Hall, A.	299·4	...	0·55	...	1878·42

A close double star on the herdsman's left heel, being the southernmost of the four stars above mentioned, and bearing from Arcturus E.S.E., 8° distant. A 3½, bright white; B 4½, bluish white, and supposed to be variable. This is a fine object, and not difficult of measurement, for I have operated upon it in full day-light.

It has been stated that each constituent presents, alternately, a clear and a dim face to us; but though I frequently examined them in a dark field, it is a point which I cannot confirm.

[The earlier of the above measures in angle must be augmented by 180° to make them comparable with the others. Gledhill remarks:—"The angle was unchanged from 1796 to 1841: a slow retrograde motion then began, accompanied by a diminution in distance."]

987. 126 H. I. VIRGINIS. (h. 1874; H. 3987; R.)

	h.	m.	s.			s.
R. A.	**14**	**39**	**19**	Prec.	+	3·03
		°	′			″
Decl.	**N**	**2**	**25·3**	——	S	15·41

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; L; vm E; b M B N;" which means:—"bright; large; very much extended; brighter in the middle where there is a bright nucleus."

988. 10 HYDRÆ. DXIX.

	h.	m.	s.			s.
R. A.	**14**	**39**	**39**	Prec.	+	3·46
		°	′			″
Decl.	**S**	**24**	**58·4**	——	S	15·39

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	128·2	...	11·3	...	1783·03
Stone, O.	130·2	...	9·0	...	1879·24

A neat double star, about 9° S. by W. of *a* Libræ, and 5° due W. of

20 Libræ, a star of the $3\frac{1}{2}$ magnitude. It is close to the boundary of *Turdus Solitarius*, an insignificant asterism intruded by Le Monnier, in 1776, to commemorate the Hermit-bird of India, between Hydra, Virgo, and Libra. A $5\frac{1}{2}$, pale orange; B $7\frac{1}{2}$, violet tint. This is a very beautiful object for a moderate telescope; but its identity has been jeopardised by its synonyms, being 54 Hydræ of H̶., 30 Turdi Solitarii of H. and S., and 73 Hydræ of Bode.

989. ε BOÖTIS. (Σ. 1877.) DXX.

R. A. 14h. 40m. 11s. | Prec. + 2s.·62

Decl. N 27° 32′·2 | —— S 15″·35

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	323·0	...	3·93	...	1822·55
STRUVE, W.	320·9	...	2·64	...	1829·39
SMYTH	321·2	...	2·9	...	1838·68
FLETCHER	322·7	...	2·77	...	1850·95
DAWES	324·4	...	2·83	...	1860·05
DUNÉR	327·6	...	2·67	...	1870·49
PLUMMER	329·1	...	2·92	...	1876·70
JEDRZEJEWICZ	328·0	...	2·77	...	1877·49

A *Nautical Almanac* star, on the herdsman's left hip; where it is readily shown by a line from ζ in the Great Bear's tail through η at its tip, carried away into the S.S.E. till it meets a bright star in mid-distance between α Boötis and α Coronæ Borealis. A 3, pale orange; B 7, sea green; the colours being distinct and strongly contrasted. This lovely object, which Σ. calls "pulcherrima," is 1 H̶. I., or *par excellence* A^1, as they would say at Lloyd's; and being in a manner insulated, afforded grounds to its discoverer's concluding the *comes* to be a binary partner, and not merely a star at a vast distance nearly in a line behind it, as may be the case in those parts of the heavens where small stars are profusely scattered. Subsequent observations appear to confirm this, [and it is now generally agreed that a small increase in the angle has occurred, the distance remaining unchanged. "Colour of B, emerald green."—*Brodie.*]

ε Boötis is the περιζώμα of Ptolemy; but appears as Izár, in various Catalogues, from the Arabian word signifying a zone or girdle. It is also designated *Mízár*, a waist-cloth, or apron; and when ill-written in the Arabic, Mirár, whence the Merer and Meirer of the Alphonsine Tables, subsequently changed into Mirac and Micar.

990. 356 Dunlop LUPI. (h. 3580; H. 3989.)

	h. m. s.		s.
R. A.	14 41 4	Prec. +	4·26
	° ′		″
Decl.	S 54 3·8	—— S	15·30

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p Ri; l C; st 10 . . . 11;" which means:—"a cluster; pretty large; pretty rich; but little condensed; the stars are of about the 10th and 11th magnitudes."

991. 286 B BOÖTIS. (Σ. 1884.)

	h. m. s.		s.
R. A.	14 43 31	Prec. +	2·67
	° ′		″
Decl.	N 24 49·8	—— S	15·16

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	52·2	...	1·23	...	1829·78
SECCHI	55·9	...	1·48	...	1865·50

A close double star. A 6½, yellowish; B 8½, bluish.

992. α^2 LIBRÆ. DXXI.

	h. m. s.		s.
R. A.	14 44 47	Prec. +	3·31
	° ′		″
Decl.	S 15 35·0	—— S	15·24

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	314·5	...	230·8	...	1823·5

A *Nautical Almanac* star with a distant companion. A 3, pale yellow; B 6, light grey. Though this object is the leader of Libra, and one of its two *lucidæ*, it is located on the southern chelate hand-claw of Scorpio; yet it is called Kiffa Australis, from the Arabian *al kiffah-al-jenúbíyah*, the southern scale. It may be found by carrying an occult line from α Boötis to α Virginis, and from thence a rectangular one, led about 22° to the E., passes nearly over α^2 Libræ. Or a readier reference is found in the galley rhymes:

Where yon gaunt Bear disports a tail, seek Alkaid at its tip,—
From thence a ray athwart the space to south-south-east must dip;
And when Arcturus has been pass'd, prolong th' imagin'd line,
'Twill mark a star, as far again, the first in Libra's sign.

B is α^1 of Bayer; and the two form a fine though wide object, which was measured in full twilight without artificial illumination.

Libra, the Balance, is the 7th in order of the 12 signs of the zodiac, and the first of the autumnal ones. The integrity of its boundaries has been largely encroached upon by Scorpio; but the numbers of its component stars have thus progressively increased, with the improvement of optical means:

Ptolemy	17 stars.	Hevelius	21 stars.
Tycho Brahé	18 „	Flamsteed	51 „
Griemberger	20 „	Bode	180 „

Servius assures us, that the original Chaldean zodiac consisted of but eleven constellations; and this may be explained by assuming that the body of Scorpio occupies one sign, and the pincers, or χήλαι, another; for Aratus mentions them as being distinct. Libra is supposed to have been introduced by the astronomers of Alexandria, though another story says that the Roman *savans* added it in honour of Julius Cæsar; and, in either case, its being met with on the famous zodiac of Denderah, destroys the claim of remote antiquity set up for that performance. Vitruvius, Pliny, and Columella recognise the sign Libra, while Ovid and Germanicus hoist the colours of Chelæ; and others attempted to smooth the matter over by a mezzo-termine varnish, as on the Farnese globe, where Scorpio's claws carry the Scales. But Ruæus is in error when he accuses Virgil, in common with other ancients, of being ignorant of Libra; for though in flattering Augustus in the first *Georgic* he makes mention of the *Chelæ*, yet, in the very same book, he distinctly says,

Libra die somnique pares ubi fecerit horas.

It is true, that a century afterwards Ptolemy describes the Chelæ as an asterism in his Sidereal Catalogue, giving it 8 regular stars and 9 *amorphotæ;* but he mentions Libra in his text. Petavius has shown that Servius mistook his author, when he pulled in Virgil to certify that Libra was of Augustus's day; and some set no bounds to its antiquity, telling us that it is mentioned in the sacred books of India, 1200 years before that time, nay, even the 15th verse of the xlth chapter of Isaiah has been pressed into its service.

Libra is considered as typifying the equality of the days and nights in autumn, as well as the uniform temperature of the air at that season. Some astrologers, not keeping the proximity of the accursed Scorpion before their eyes, considered it a happy sign, and represented it, as indicative of abundance, by "vir utraque manu spiculum tenens:" yet this aërial trigon is harshly denounced in the illuminated Almanack for 1386, for it is there asserted that "whoso es born in yat syne sal be an ille doar and a traytor." But notwithstanding the struggle made by Dupuis for its Ogygian antiquity, Libra is often deemed an interloper upon the *Scorpionis forceps;* and since that intrusion, Le Monnier, in 1776, formed some stars between the southern saucer of the Balance, and the tail of Hydra, into the *Turdus Solitarius;* the property having belonged to those asterisms.

993. 5071 Brisb. CIRCINI. (*h. 4707.)

	h.	m.	s.			s.
R. A.	14	44	53	Prec.	+	4·98
	°	′				″
Decl.	S 65	57·8		——	S	15·08

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	225·2	1·50	1837·51

A double star. A 7½; B 8.

994. 39 BOÖTIS. (Σ. 1890.) DXXIII.

	h.	m.	s.			s.
R. A.	14	45	57	Prec.	+	2·04
	°	′				″
Decl.	N 49	10·3		——	S	15·02

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	45·1	4·6	1822·93
STRUVE, W.	44·2	3·7	1836·50
DUNÉR	43·7	3·4	1870·48
JEDRZEJEWICZ	44·2	3·7	1877·74

A neat double star, following the herdsman's right wrist; and it may be seen by running a line from Polaris through β, the preceding guard, and prolonging it just as far again. A [6], white; B 6½, lilac. This is a pretty object, and may, from a comparison of the several results, have a slow retrograde motion.

This double star is an outlier of the 32 sporades which La Lande scraped together in 1795 to form the new asterism Quadrans Muralis, in commemoration of his nephew's *Histoire Céleste Française;* which work enrolled no fewer than 50,000 stars, and constitutes, as Olbers justly remarked, one of the most important productions of the eighteenth century. The instrument with which the observations were made was therefore placed aloft, as a candidate for immortality; and it certainly merited celestial honours, more than some of the recent intruders. The little star about 2½° directly S. of it, 38 Boötis, is the *Merga,* or corn-fork, of Bayer. [44 Boötis follows it, a little to the S.]

995. ξ BOÖTIS. (Σ. 1888.) DXXII.

	h. m. s.		s.
R. A.	14 46 18	Prec. +	2·75
	° ′		″
Decl.	N 19 33·6	—— S	15·00

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	24·1	...	3·42	...	1780·28
Herschel, W.	353·9	...	6·00	...	1804·25
Struve, W.	334·2	...	7·22	...	1829·46
Smyth	332·1	...	7·3	...	1831·53
Smyth	322·9	...	6·9	...	1842·42
Fletcher	317·4	...	6·56	...	1851·11
Dembowski	303·1	...	5·65	...	1862·55
Doberck	282·9	...	4·70	...	1877·24
Jedrzejewicz	275·9	...	4·19	...	1880·48

A binary star, in the left knee of Boötes; being the northernmost of the four stars forming his leg, and 10° E. of α. A 3½, orange; B 6½, purple; the colours in fine contrast.

[The period of this object is not certainly known at present, but it would seem to be from 120^{y} to 140^{y}. Doberck gives $127·3^{y}$.]

996. 5112 Brisb. LUPI. (*h. 4715.)

	h. m. s.		s.
R. A.	14 48 58	Prec. +	4·01
	° ′		″
Decl.	S 47 25·9	—— S	14·85

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	277·8	...	3·0	...	1835·07

A double star. A 6½; B 7.

997. 212 P. XIV. LIBRÆ. DXXIV.

	h. m. s.		s.
R. A.	14 50 55	Prec. +	3·40
	° ′		″
Decl.	S 20 53·2	—— S	14·74

		Position.		Distance.		Epoch.
		°		″		
Herschel, J., and South	A B	270·1	...	10·8	...	1823·32
Main	A B	283·9	...	13·5	...	1862·38
Burnham	A B	289·6	...	15·1	...	1880·41
	A C	322·2	...	120·6	...	1878·32
	A D	171·0	...	52·5		
	A E	52·5	...	69·4		
	A F	166·5	...	105·5		

A multiple star nearly in mid-distance between α and Flamsteed's

20 Libræ. A 6, straw-coloured; B 8, orpiment yellow; C 16, pale red; and several minute stars in the field.

["One of the most interesting systems in the heavens, second only to 61 Cygni, from the very large but unequal proper motion of the two principal components. The distant stars are all faint, and do not participate in this movement. The changes are due to the proper motion of the large stars. This system is well worthy of the attention of observers for the determination of parallax."—*Burnham.*]

998. β URSÆ MINORIS. DXXVI.

	h. m. s.		s.
R. A.	**14 51 2**	Prec. −	0·23
Decl.	**N 74° 36′·3**	—— S	14″·71

	Position.		Distance.		Epoch.
BURNHAM	342°.8	...	207″.8	...	1879·30

A *Nautical Almanac* star, with a distant *comes* on the Lesser Bear's left shoulder. A 3, reddish; B 11, pale grey; several small stars in the field.

This star is designated Kocab, from the Arabian *kaŭkab-al-shemálí*, the North star, it having been nearer to the Pole than α, in Ptolemy's time. It is within the Arctic Circle, which has been through all ages esteemed the vertex of the heavens, and anciently was a variable distance from the polar point, always equal to the latitude of the place. The first person who fixed the polar circles to a constant distance was our countryman Sacro-bosco, *anglicè* Holywood. From such circumstances Kocab, which is still a useful star, had its day; and a line from α Boötis through η Ursæ Majoris, and by α Draconis, will identify it; or resorting to the rhymester, its vicinity to the present Polaris may be thus stated:

Kocab, one bright, and two faint stars, grace Lesser Ursa's side,
In oblong square; trace her bent tail, and to the Pole you'll glide.

β Ursæ Minoris and γ were stars of no small utility and renown among those who craved the use of a natural and never-failing nocturnal clock; and if in our day navigators are indebted to lunar observations, so the old mariners were beholden to the heavens for various professional facilities. Thus they shifted their tides by the Moon's bearing, and told the hour by the Sun's rhumb. It was also readily seen how smoothly the Little Bear was every day swung round the Pole-star as about an axis; and as it never sets to Europe, the circle described is universally available in these latitudes. The two southernmost of the stars—making nearly a right line to the direction of the Pointers—with Polaris, are the most conspicuous objects of the constellation, though all the principal constituents are clearly traceable by the naked eye, forming a miniature of the Great Bear, only with the tail more curved. β, on the animal's shoulder, and γ, in its ear, are designated the Guards—"of the Spanish word *guardare*," saith Hood, "which is to beholde, because they are diligently to be looked unto, in regard of the singular use which they have in navigation." In that rare old work, the *Safegard of Saylers*, there is a chapter "Howe to knowe the houre of the night by the Guards, by knowing on what point of the compass they shall be at midnight, every fifteenth day throughout the whole yeare." * * "Now, when you know on what point of the compasse the Guardes are alwaies at midnight, then may yee by it also knowe the houres before or after midnight, alway reckoning for every point that they shall lack of the midnight point three quarters of an houre." But Richard Eden, the worthy friend of Sebastian Cabot, bestirred himself beyond most of his competitors in the improvement of hydrography, and was the cause of much attention to nautical objects. In the *Arte of Navigation* which he "Englished out of the Spanyshe," in 1561, the xviith chapter treats of the "composition and use of an instrument generall for the houres of the night," by the circle which the "two starres called the Guardians, or the mouth of the horne," describe. The base-work being:

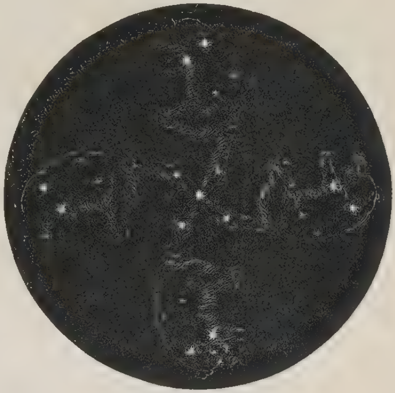

FIG. 30. URSA MINOR.

19th April.	Guard perpendicular over the Pole-star	at Midnight.
12th October.	Guard perpendicular under the Pole-star	

This instrument consisted of a fixed circle, and a moveable one: "When you desire to know the houre, you shall turn the index of the less rundell in which is written Time, to that part of the great rundell where is marked the day in which you desire to know the houre, and directing your face toward the north you shall turn the head toward the height of heaven." You are then directed to look at the Pole-star through the centre, and turn the concentric circle till the two Guards are seen in their respective holes, "and all three with one eye," and the hour shall be shown on the smaller circle. There is still more upon the Guards in Tap's *Seaman's Grammar*, 1609; all tending to show the important utility of the asterism. "How often," meditates Hervey, "has this star beamed bright intelligence on the sailor, and conducted the keel to its destined haven." In the preceding diagram the changes visible to the eye are shown when the Bear is on the meridian, and at six hours, midnight, and eighteen hours.

999. 18 LIBRÆ. (Σ. 1894.) DXXV.

	h.	m.	s.		s.
R.A.	14	52	57	Prec. +	3·24
	°	′			″
Decl.	S 10	42·0		—— S	14·61

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	45·3	...	17·9	...	1782·26
Herschel, J., and South	35·9	...	26·6	...	1823·30
Struve, W.	38·7	...	19·4	...	1831·09
Wilson, &c.	39·6	...	20·1	...	1874·44

A delicate double star, under the centre of the Balance beam; where it is nearly the last of a little group, at about 5° N.N.E. of *a* Libræ. A 7, straw colour; B 11, grape-red; and an occult line through the two leads to a third star in the *nf* quadrant, of the 12th magnitude, and ruddy. The measures show larger discrepancies than are merely attributable to its difficulty.

1000. 3585 h. LUPI. (H. 4018.)

	h.	m.	s.		s.
R.A.	14	54	12	Prec. +	4·22
	°	′			″
Decl.	S 51	28·8		—— S	14·53

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p Ri; l C;" which means:—"a cluster; pretty large; pretty rich; little condensed."

1001. δ LIBRÆ.

	h.	m.	s.		s.
R.A.	14	55	5	Prec. +	3·20
	°	′			″
Decl.	S 8	4·9		—— S	14·48

A variable star, discovered to be such by Schmidt in 1859. The range is from about the 5th to the 6th magnitude, and the period very short, only 2·32^{d}.

1002. 756 H. II. BOÖTIS. (h. 1898; H. 4029; R.) DXXVII.

	h.	m.	s.		s.
R. A.	14	55	23	Prec. +	1·78
	°	′			″
Decl. N	54	20·7		—— S	14·46

A small pale-white nebula, with a bright centre, in the space between the right hand of Boötes and Draco's belly. It precedes a fine though wide double star, of the 7th and 8th magnitudes, from the following of which, four equidistant very minute stars extend in a line *sf* = 150°. If a curved line is drawn from θ Draconis to η Ursæ Majoris, at the tip of the Great Bear's tail, passing through the three stars in the hand of Boötes, it will pass the nebula's site in mid-distance.

["Very faint and very small in 8½in refractor."—*Brodie.* Webb remarks that from the double star "a straight line of smaller stars extends." The double star alluded to is South 191, for which Dembowski gives Pos. 342·2°; Dist. 40·2″; Epoch 1874·20.

1003. 127 H. I. LIBRÆ. (h. 1896; H. 4026.)

	h.	m.	s.		s.
R. A.	14	55	36	Prec. +	3·05
	°	′			″
Decl. N	2	8·3		—— S	14·46

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pS; R; psmbM;" which means:—"bright; pretty small; round; pretty suddenly much brighter in the middle."

1004. 3588 h. LUPI. (H. 4031.)

	h.	m.	s.		s.
R. A.	14	57	12	Prec. +	4·34
	°	′			″
Decl. S	53	54·6		—— S	14·35

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vL; Ri; lC; st 9 . . . 12;" which means:—"a cluster; very large; rich; little condensed; the component stars vary from the 9th to the 12th magnitudes."

1005. 3589 h. LUPI. (H. 4032.)

	h.	m.	s.		s.
R. A.	14	57	32	Prec. +	4·41
	°	′			″
Decl. S	55	9·5		—— S	14·33

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; cL; Ri; lCM; st 13 . . . 14;" which means:—"a cluster; considerably large; rich; but little compressed in the middle; the component stars are of the 13th and 14th magnitudes."

1006. π LUPI. (*h. 4728.)

R. A.	h. 14 m. 57 s. 36	Prec. +	s. 4·04
Decl.	S 46° 37′·5	—— S	″ 14·33

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	111·1	...	0·75	...	1835·68

A double star. A $5\frac{1}{2}$; B $5\frac{1}{2}$.

1007. 44 BOÖTIS. (Σ. 1909.) DXXIX.

R. A.	h. 15 m. 0 s. 11	Prec. +	s. 2·01
Decl.	N 48° 5′·0	—— S	″ 14·17

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	229·1	...	2·28	...	1821·33
Struve, W.	234·0	...	2 86	...	1832·24
Dawes	236·7	...	4·49	...	1851·52
Powell	238·8	...	5·04	...	1861·29
Dunér	241·0	...	4·79	...	1871·28
Flammarion	241·8	...	4·61	...	1877·56
Jedrzejewicz	241·3	...	4·99	...	1880·65

A binary star, in the space following the right arm of Boötes; where a line from the Pole-star, carried between the two Guards, and continued nearly as far again to the southward, will meet it about 7° to the N. of β Boötis. A 5, pale white; B 6, lucid grey; a distant star in the *np* quadrant. This fine physical object was discovered by HI., and is, as he remarked, a miniature of Castor.

44 Boötis is a remarkable and highly interesting star. It is quite palpable that the distance has augmented since 1781; and that the stars are still separating, though it is difficult to establish the exact annual increase of such increment. There is also strong presumptive evidence of a slow orbital change in the same period; but, except there exist some conspiring errors in the angles or readings, the case is beset with difficulties. The angles show that the apparent path is not entirely rectilinear, and if all the observations be retained, that the orbital plane of this system is very nearly parallel with that of our own, since the companion first appeared in a direction opposite to the present one.

"It is true," says Sir J. Herschel, "that an orbit passing nearly through the eye, and so situated that the longer axis of the ellipse into which it is projected shall form an angle of about 6° with the meridian, would account for the remarkable *jump* the small star seems to have made from one side to the other of the large one."

[A period of 181^{y} was assigned by Mädler, but Doberck puts it at 261^{y}.]

1008. 128 ♅. I. SERPENTIS. (h. 1901; H. 4045; 𝕽.)

	h.	m.	s.			s.
R. A.	15	0	54	Prec.	+	3·04
		°	′			″
Decl.	N	2	2·2	——	S	14·13

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; R; psb M N; f of 2;" which means:—"very bright; pretty large; round; pretty suddenly brighter in the middle where there is a nucleus; the following one of 2 nebulæ." The other nebula here mentioned (=511 ♅. III.; H. 4042) is "v F; R;" or "very faint and round."

1009. 279 P. XIV. BOÖTIS. (Σ. 1910.) DXXX.

	h.	m.	s.			s.
R. A.	15	2	14	Prec.	+	2·90
		°	′			″
Decl.	N	9	38·9	——	S	14·04

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	209·2	...	4·78	...	1823·42
STRUVE, W.	209·1	...	3·80	...	1832·08
SMYTH	209·7	...	4·0	...	1835·39
STRUVE, O.	210·5	...	4·22	...	1851·00
JEDRZEJEWICZ	212·1	...	4·27	...	1877·48

A very neat double star, in the space between the left foot of Boötes and the snake of Ophiuchus. A and B, each $7\frac{1}{2}$, and each pale white.

This star is preceded at a quarter of a minute's time by 277 P. XIV., by which it may be identified in *fishing;* and it may be readily picked up by running an imaginary line from *α* Boötis over ζ, and continuing it rather more than as far again into the S.E. region.

[Probably endued with a very slow direct motion.]

1010. 215 H. I. DRACONIS. (h. 1909; H. 4058; ℜ.) DXXXI.

	h.	m.	s.			s.
R.A.	15	3	24	Prec.	+	1·63
		°	′			″
Decl.	N	56	11·4	——	S	13·96

A bright-class oval nebula, under the body of Draco, with its major axis trending towards the vertical of the *np* and *sf* quadrants. It is rather faint at the edges, though not so as to obscure the form. There is a small star nearly above it, and three larger more distant, of which the preceding is coarsely double. It lies about 7° to the W.S.W. of θ Draconis, or one-third of the distance towards η Ursæ Majoris.

[Engraved, *Phil. Trans.*, 1850, Pl. xxxvii. Fig. 8. On April 27, 1848, Lord Rosse perceived a longitudinal division in this object, but this was not clearly confirmed in subsequent years.]

1011. κ LUPI.

	h.	m.	s.			s.
R.A.	15	4	16	Prec.	+	4·12
		°	′			″
Decl.	S	48	19·3	——	S	13·92

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	144·2	...	27·2	...	1837·09

A double star. A 5½; B 7.

1012. ι^1 LIBRÆ. DXXXII.

	h.	m.	s.			s.
R.A.	15	5	53	Prec.	+	3·40
		°	′			″
Decl.	S	19	22·4	——	S	13·82

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	112·5	...	59·0	...	1781·40
BURNHAM	110·5	...	57·5	...	1878·30

A wide double star, on the southern claw of Scorpio, preceding the group of which β Scorpii is the principal, by 15° on the parallel. A 5½, pale yellow; B 9½, purple; there is a third star of the 10th magnitude in the *sf* quadrant, which in 1822 was noted by H. and S. as "precisely in a line," but the angles at my epoch were from A to B 110·5°, and from A to C 107·4°. [B has been found by Burnham to be a close double (=β 618). Pos. 24·3°; Dist. 1·86″; Epoch 1878·30; mags. 10, 10½.]

1013. — CIRCINI. (*h. 4746.)

		h.	m.	s.			s.
R. A.		15	6	47	Prec.	+	4·63
		°	′				″
Decl.	S	58	39·6		——	S	13·75

"Curiously multiple. One of its companions is close double, pointing to the large star, which is 8 mag. The smaller stars are 12 or 13 mag. Such multiple stars are rare. It is a close group, not above 1½′ diameter. In the diagram 10 companions are laid down."—(*Sir J. Herschel.*)

1014. 102 M. (?) DRACONIS. (h. 1910; H. 4064; 𝕽.) DXXXIII.

		h.	m.	s.			s.
R. A.		15	6	55	Prec.	+	1·55
		°	′				″
Decl.	N	57	25·6		——	S	13·78

A small but brightish nebula, on the belly of Draco, with four small stars spreading across the field, N. of it. There may be a doubt as to whether this is the nebula discovered by Méchain in 1781, since Messier merely describes it as "very faint," and situated between ο Boötis and ι Draconis. But there must be some mistake; the one being on the herdsman's leg, and the other in the coil of the Dragon far above the head of Boötes, having 22° of declination and 44^{m} of time between them, a space full of all descriptions of celestial objects. But as the θ in the raised right hand of Boötes, if badly made, might be mistaken for an *omicron*, this is probably the object seen by Méchain, and h.'s 1910; it being the brightest nebula of 5 in that vicinity. A line from κ in Draco's tail, led to the S.E. through α Draconis, and prolonged as far again, strikes upon its site.

[In view of Smyth's doubts as stated above I have taken Sir J. Herschel's place and not Smyth's. The difference is $+42^{s}$ in R. A., and +1′ in Decl.]

1015. 1919 Σ. BOÖTIS.

		h.	m.	s.			s.
R. A.		15	7	51	Prec.	+	2·72
		°	′				″
Decl.	N	19	41·2		——	S	13·69

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	10·2	24·8	1832·21
MAIN	8·7	23·8	1863·30

A double star. A 6, yellowish white; B 7½, white.

1016. 14 P. XV. LIBRÆ. DXXXIV.

		h.	m.	s.		s.
R.A.		15	8	15	Prec. +	3·38
		°	′			″
Decl.	S	18	0·8		—— S	13·66

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	141·0	49·0	1823·30
STONE, O.	139·7	47·4	1879·39

A coarse double star, on the lower hand-claw of Scorpio; it is N.N.E. of ι^1 Libræ, and 9° S. of β, in the same asterism. A 8, silvery white; B 9, pale grey; a third star follows in the N.

[Alias 97 B Libræ.]

1017. 3594 h. LUPI. (H. 4066.)

		h.	m.	s.		s.
R.A.		15	9	20	Prec. +	4·06
		°	′			″
Decl.	S	45	14·3		—— S	13·59

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"○; v S; R; quite sharp;" which means:—"a planetary nebula; very small; round; quite sharp." Engraved, *Cape Obs.*, Pl. vi. Fig. 8.

1018. 1926 Σ. BOÖTIS.

		h.	m.	s.		s.
R.A.		15	10	46	Prec. +	2·28
		°	′			″
Decl.	N	38	42·7		—— S	13·49

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	260·6	1·59	1830·60
MÄDLER	261·0	1·46	1842·69
DUNÉR	264·9	1·37	1871·42
BURNHAM	259·1	1·43	1878·44

A close double star. A 6, yellowish; B 9, blue. Dunér notes A as "Blanche;" and B sometimes as "Azur" and sometimes as "Cendrée."

1019. μ LUPI.

		h.	m.	s.		s.
R.A.		15	10	52	Prec. +	4·12
		°	′			″
Decl.	S	47	28·9		—— S	13·49

		Position.	Distance.	Epoch.
		°	″	
HERSCHEL, J.	A C	131·3	22·9	1836·68
	A B	173·6	2·08	1836·55

A triple star. A 5; B 6; C 8. A is μ^1 Lupi and *h. 4753.

1020. 19 Ḥ. VI. LIBRÆ. (h. 3596; H. 4075.) DXXXV.

R. A.	**15h 10m 57s**	Prec. + 3s·43
Decl.	**S 20° 38′·0**	—— S 13″·49

A large compressed cluster of very minute stars, in the Scorpion's southern pincer, with 8 brightish stars vertically curved in the following part of the field, and half a dozen duller preceding. It is faint and pale, but owing to the fineness of the night, steadiness of gaze, and excellent action of the telescope, was as well seen as so low and so awfully remote an object could be expected to be. There was much interest attached to the observation, because this cluster is one of the gradations from the palpable congeries of stars, in the Herschelian system, towards the distant nebulæ. The illustrious astronomer thus treats of it, in *Phil. Trans.* vol. lxxxi :—

"When I pursued these researches, I was in the situation of a natural philosopher who follows the various species of animals and insects from the height of their perfection down to the lowest ebb of life; when, arriving at the vegetable kingdom, he can scarcely point out to us the precise boundary where the animal ceases, and the plant begins; and may even go so far as to suspect them to be not essentially different. But recollecting himself, he compares, for instance, one of the human species to a tree, and all doubt upon the subject vanishes before him.

"In the same manner we pass through gentle steps from a coarse cluster of stars, such as the Pleiades, the Præsepe, the Milky Way, the cluster in the Crab, the nebula in Hercules, that near the preceding hip of Boötes, etc. etc., without any hesitation, till we find ourselves brought to such an object as the nebula in Orion, where we are still inclined to remain in the once adopted idea, of stars exceedingly remote and inconceivably crowded, as being the occasion of that remarkable appearance. It seems, therefore, to require a more dissimilar object to set us right again. A glance like that of the naturalist, who casts his eye from the perfect animal to the perfect vegetable, is wanting to remove the veil from the mind of the astronomer. The object I have mentioned above (No. 234, *ante*), is the phenomenon that was wanting for this purpose. View, for instance, this cluster, and afterwards cast your eye on that cloudy star, and the result will be no less decisive than that of the naturalist we have alluded to. Our judgment, I may venture to say, will be, that *the nebulosity about the star is not of a starry nature.*"

This wondrous but difficult object bears 9° due S. of β Libræ.

1021. δ BOÖTIS. DXXXVII.

	h.	m.	s.			s.
R. A.	15	11	3	Prec.	+	2·41
		°	′			″
Decl.	N	33	43·7	——	S	13·48

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	79·6	...	105·3	...	1822·80
Struve, W.	78·9	...	104·8	...	1835·60
Burnham	78·6	...	104·6	...	1879·48

A star with a distant companion, on the left shoulder of Boötes. A 3½, pale yellow; B 8½, light blue.

δ Boötis is the S.E. component of the trapezium formed with β, γ, and μ, which was designated *Al-dhibá'*, the hyæna, in Arabian astronomy: a line from α Boötis through ε, carried as far again beyond, reaches it.

1022. β LIBRÆ. DXXXVI.

	h.	m.	s.			s.
R. A.	15	11	5	Prec.	+	3·22
		°	′			″
Decl.	S	8	58·6	——	S	13·47

	Position.		Distance.		Epoch.
	°		″		
Smyth	85·3	...	570	...	1836·34

A *Nautical Almanac* star, with a distant companion, on the Scorpion's northern hand-claw; it will be identified by projecting an occult curve from Antares through β Scorpii, and carrying it to twice the interval between those two stars. A 2½, pale emerald; B 12, light blue; and there are two other stars in the N. part of the field, forming the base of a triangle whose vertex is A. The same bright object is also, in alignment, the apex of a grander triangle, of which α Boötis and α Virginis form the base; and we learn:

> Two stars form Scorpio's heart, will form a westward rising line,
> *This* Scorpio's second star, and *that* the same in Libra's sign.

A Chaldean observation of the approach of Mars to this star is recorded, which appulse was observed in the 476th year of Nabonassar, or 271 B.C. It was a star of some note of old, and was not *en bonne odeur* with astrologers. It appears in Catalogues under the name of Kiffa Borealis, from the Arabian *al-kiffah-al-shemálíyah*, the northern scale.

[Respecting β Libræ Webb notes "its beautiful pale green hue, very unusual among conspicuous stars; deep green, like deep blue, is unknown to the naked eye."]

1023. 5 M. LIBRÆ. (h. 1916; H. 4083.) DXXXVIII.

		h.	m.	s.			s.
R. A.		15	12	57	Prec.	+	3·02
		°	′				″
Decl.	N	2	30·1		—	S	13·36

A close cluster of stars, over the beam of the Balance, in a narrow channel led into Serpens, and close to 5 Libræ, which is double. This superb object is a noble mass, refreshing to the senses after searching for faint objects; with outliers in all directions, and a bright central blaze which even exceeds 3 M. in concentration. Messier, who registered this in 1764 [but it was discovered by G. Kirch in 1702], describes it as a beautiful round nebula, adding, "et je me suis assuré qu'elle ne contient aucune étoile." This is curious, as the mass is so easily resolveable; though its laws of aggregation into so dense and compact a ball are at present beyond reach. In May, 1791, Sir W. Herschel directed his grand 40ft reflector to this object, and counted about 200 stars; though the middle of it was so compressed, that it was impossible to distinguish the components.

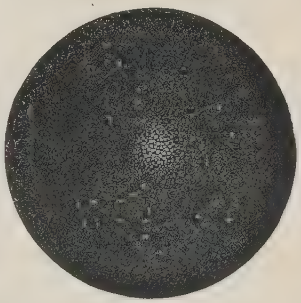
Fig. 31. 5 M. Libræ.

In his description of this object, Sir William remarks on the difficulty of observing with so large an instrument, as well from variable temperature as from alteration in the mirror's lustre; "but," he adds, "if we will have superior views of the heavens, we must submit to circumstances that cannot easily be altered."

[Engraved, *Phil. Trans.*, 1833, Pl. viii. Fig. 87. Described at Parsonstown, May 26, 1875, as "more than 7′ or 8′ in diameter; very condensed part in middle about 1′ in diameter; stars 12th to 15th magnitudes, many going out from centre in curved lines."]

1024. 759 H. II. BOÖTIS. (h. 1917; H. 4087; R.) DXL.

		h.	m.	s.			s.
R. A.		15	12	57	Prec.	+	1·55
		°	′				″
Decl.	N	56	43·2		—	S	13·36

A long pale-white nebula, which though classed in Boötes is really in Draco. Designated by Sir J. Herschel as "a superb ray nebula." In my instrument it is a faint streak, trending *np* and *sf*; it requires the eye to *settle* before its outline is well seen. There is a little group of

5 stars in the *np* quadrant, and one in each of the others, all about 11th magnitude. In H.'s 20ft telescope it was 7½′ in length. It bears S.S.E. from θ Draconis, nearly 3°; being exactly on the following parallel of the distant ε Ursæ Majoris.

[Engraved, Rosse, woodcut, *Phil. Trans.*, 1861; D'Arrest, *Siderum Nebulosorum*, p. 290.]

1025. 1931 Σ. SERPENTIS.

	h.	m.	s.			s.
R. A.	15	13	25	Prec.	+	2·88
		°	′			″
Decl.	N	10	49·6	——	S	13·33

	Position. °	Distance. ″	Epoch.
Struve, W.	172·5	13·0	1832·21
Dawes	172·1	13·0	1851·31
Main	173·1	13·5	1863·35

A double star. A 6½, white; B 8, white.

1026. 1 B. CORONÆ BOREALIS. (Σ. 1932.)

	h.	m.	s.			s.
R. A.	15	13	37	Prec.	+	2·56
		°	′			″
Decl.	N	27	13·6	——	S	13·32

	Position. °	Distance. ″	Epoch.
Struve, W.	273·8	1·62	1830·28
Struve, O.	279·3	1·65	1841·46
Mädler	283·6	1·45	1851·88
Mädler	289·4	1·34	1860·70
Dunér	297·0	1·10	1870·29
Doberck	303·5	1·26	1877·37
Jedrzejewicz	302·3	0·90	1880·46

A double star. A 6, very white; B 6½, very white. Struve suspected variability in the components. The angle has visibly increased, and a decrease in the distance is almost as certain.

1027. 5 SERPENTIS. (Σ. 1930.) DXXXIX.

	h.	m.	s.			s.
R. A.	15	13	39	Prec.	+	3·03
		°	′			″
Decl.	N	2	11·5	——	S	13·32

	Position. °	Distance. ″	Epoch.
South	39·0	10·7	1825·45
Struve, O.	39·2	10·5	1848·38
Secchi	37·1	10·6	1858·52
Holden	38·2	10·6	1875·40

A delicate double star, among the marginal stragglers of the cluster

5 M.: it is 9° to the S.W. of *a* Serpentis, and 24° to the S.E. of *a* Boötis. A 5½, pale yellow; B 10½, light grey. This is a fine object. My results being as nearly coincident as could be expected in so delicate an object, I considered this star to be "done with;" but finding, on the arrival of the Dorpat Catalogue in 1837, that Professor Struve considered A to be oblong, and consequently double, I took the first good opportunity to scrutinize it closely, and catch another set of measurements. The night was beautiful, the instrument in its best action, and the stars distinct and clear; but no effort could elongate the primary.

["The stars have a rapid common proper motion. Orbital motion seems to be indicated by the slight increase in distance and diminution of the angle."—*O. Struve*, cited by *Gledhill.*]

[Rather more than 1° *sf* is 6 Serpentis, found to be double by Burnham with a 6^{in} refractor in 1872 (=β 32). For this object Dembowski gives:—Pos. 13·2°; Dist. 2·28″; Epoch 1875·41. Mags. 4½, 9½.]

1028. γ CIRCINI. (*h. 4757.)

R. A.	**15**h.	**14**m.	**35**s.	Prec.	+	4s.·69
Decl.	**S**	**58**°	**55′·4**	——	S	13″·25

	Position.	Distance.	Epoch.
Herschel, J.	108°·5 ...	1″·26 ...	1837·5

A double star. A 5½; B 6.

1029. ε LUPI.

R. A.	**15**h.	**15**m.	**12**s.	Prec.	+	4s.·03
Decl.	**S**	**44**°	**17′·3**	——	S	13″·21

	Position.	Distance.	Epoch.
Herschel, J.	174°·9 ...	26″·3 ...	1837·26

A double star. A 4; B 9½.

1030. 148 H. I. SERPENTIS. (h. 1919; H. 4097.)

R. A.	**15**h.	**16**m.	**29**s.	Prec.	+	2s.·97
Decl.	**N**	**5**°	**27′·9**	——	S	13″·13

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c L; i R; vsb M * 12; am st;" which means:—"considerably bright; considerably large; irregularly round; very suddenly brighter in the middle where there is a 12th mag. star; this object lies amongst stars."

1031. η CORONÆ BOREALIS. (Σ. 1937.) DXLI.

	h. m. s.		s.
R. A.	15 18 39	Prec. +	2·46
Decl.	S 30° 41′·4	—— S	12″·99

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	25·9	...	1·57	...	1823·27
Smyth	57·2	...	0·8	...	1832·63
Smyth	151·3	...	0·5	...	1842·58
Dawes	250·1	...	0·5	...	1852·52
Struve, O.	22·5	...	0·91	...	1862·76
Dembowski	47·7	...	1·08	...	1871·45
Doberck	94·6	...	0·61	...	1878·55
Jedrzejewicz	114·2	...	*oblong*	...	1880·59
Burnham	114·3	...	0·46	...	1880·62

A binary star, midway between the Northern Crown and the club of Boötes; where a N.N.W. ray from α Coronæ carried through β, and half as far again, will hit it. A 6, white; B 6½, golden yellow; a third and very minute star seen by glimpses in the *nf* quadrant.

The connexion of the components is "fully proven," and that fact alone is a gratification to the contemplative mind, for such instances of actual development in the heavenly motions cannot be studied without inspiring an increase of veneration for the Almighty Disposer of the Universe, and of zeal for the progress of astronomical inquiry.

[The short period of this star, the closeness of its components, and its rapid orbital motion are things which combine to render its study a matter of some difficulty. To this fact it is due that its period is not yet very certainly known, though the majority of computers put it at about 40y. The latest value is Doberck's = 41·56y. It has therefore made 2 complete revolutions since first measured by Sir W. Herschel in 1781.]

1032. 357 Dunlop LUPI. (h. 3603; H. 4100.)

	h. m. s.		s.
R. A.	15 19 29	Prec. +	4·48
Decl.	S 54° 8′·1	—— S	13″·08

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; v Ri; l C; st 11 ... 14;" which means:—"a cluster; very large; very rich; little compressed; the component stars vary from the 11th to the 14th magnitude."

1033. 389 Dunlop LUPI. (h. 3604; H. 4101.)

		h.	m.	s.			s.
R. A.		15	20	4	Prec.	+	4·30
		°	′				″
Decl.	S	50	17·3		——	S	12·89

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; cB; L; R; vgbM; rrr; st 15;" which means:—"a globular cluster; considerably bright; large; round; very gradually brighter in the middle; well resolved—clearly seen to consist of stars, which are as small as the 15th magnitude."

1034. μ^1 BOÖTIS. (Σ. 28 App. I.) DXLII.

		h.	m.	s.			s.
R. A.		15	20	21	Prec.	+	2·28
		°	′				″
Decl.	N	37	45·8		——	S	12·87

		Position.	Distance.	Epoch.
		°	″	
STRUVE, W.	AB	172·6	108·7	1821·78
SMYTH	AB	171·8	109·0	1832·31
	BC	321·4	1·3	
JEDRZEJEWICZ	AB	171·6	108·5	1876·98

A triple star, on the upper part of the staff or club of Boötes; and one of the trapezium called *Al-ḍhibá'*, the hyæna, by the Arabians, the other members being β, γ, and δ,—μ being 4° S.E. of β. A 4, flushed white; B 8, and C $8\frac{1}{2}$, both greenish white. The large star appears as Alkalurops in the Catalogues, from *al-kalaúrops*, or καλαύροψ, a shepherd's crook or herdsman's staff, written in the Arabic characters.

This star's proper motion in space is a point of very great interest in deciding upon its physical connexion with μ^2. Even if the lowest quantity assigned be at all correct, μ^2 must be similarly affected, for the measures are surprisingly coincident.

In discussing the position and distance of A and B, as found by H. and S. in 1821, and which are almost identical with my own, Sir J. Herschel considers their fixity of importance as a palpable reference in establishing, by indisputable evidence, the fact of the close pair's rotation. In 1781 it was remarked by Sir W. Herschel that the small star followed the line joining the large one to μ (μ^1 and μ^2), and in 1802 that it had changed sides, and preceded the same line. The following object will show that this change is fully confirmed; and a distant period may determine whether the whole system has a common motion in space.

1035. μ^2 BOÖTIS. (74 P. XV. Σ. 1938.) DXLIII.

R. A.	15h	20m	22s	Prec.	+	2s·28
Decl.	N	37°	44′·0	——	S	12″·99

	Position.		Distance.		Epoch.
Struve, W.	327°·0	...	1″·38	...	1826·77
Smyth	321·4	...	1·3	...	1832·31
Smyth	306·1	...	0·8	...	1842·52
Dawes	262·2	...	0·55	...	1852·52
Dembowski	202·9	...	0·5	...	1862·55
Dunér	158·0	...	0·55	...	1872·52
Doberck	137·7	...	0·63	...	1878·49
Jedrzejewicz	122·5	...	0·6	...	1880·65

A binary star, on the tip of the herdsman's staff, where, absurdly enough, there is a third μ, viz. that of Corona Borealis, on some of our best delineations. A 8, and B 8½, both greenish white; these are the second and third components of the preceding object, and there registered also, for identity, as B and C. The retrograde orbital motion of this pair is completely established.

In discussing this interesting star in 1823 Sir J. Herschel said, "If this double star be a binary system, of which there can be little doubt, its period is about 622 years." All the subsequent observations prove that the motion has greatly accelerated; and the object is yearly becoming more difficult of scrutiny, from the diminution in its distance.

[The recent values for the period of this pair differ widely. Whilst Hind puts it at 314y, Doberck reduces it to 280·3y, Klinkerfues to 198y, and Winagradskij to 182y. Dunér remarks:—"The connection between μ Boötis and Σ. 1938 is indubitable: otherwise the motion of μ Boötis, which is considerable, would cause a very great change in the relative positions of the stars."]

1036. 76 P. XV. SERPENTIS. (Σ. 1940.) DXLIV.

R. A.	15h	21m	8s	Prec.	+	2s·72
Decl.	N	18°	33′·5	——	S	12″·81

	Position.		Distance.		Epoch.
Struve, W.	325°·4	...	1″·47	...	1830·35
Smyth	326·3	...	1·7	...	1834·41
Secchi	324·0	...	1·20	...	1856·52

A close and delicate double star, preceding the head of Serpens. A 8 and B 9½, both white.

This star is 8° S. by W. from α Coronæ Borealis, where it is intercepted by a line drawn E. from α Boötis and passed under ξ Boötis; it is so closely *nf* H. 4102 (=h. 1923; 874 H. II.) that Sir J. Herschel assumed it as a pointer whereby to identify that globular object, in the terms, "a * 7·8 m, 6′ n."

1037. ι DRACONIS. DXLV.

	h.	m.	s.		s.
R. A.	15	22	29	Prec. +	1·32
	°	′			″
Decl. N	59	21·1		—— S	12·72

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	50·0	...	254·6	...	1879·26

A bright star with a distant companion, in the middle of Draco's body. A 3, orange tint; B 9, pale yellow; several other stars in the field. This object precedes several of H.'s nebulæ, and may be readily found by running a line from the Pole-star through γ Ursæ Minoris, and carrying it nearly as far again to the S.

1038. 5351 Brisb. LUPI. (*h. 4776.)

	h.	m.	s.		s.
R. A.	15	22	57	Prec. +	3·97
	°	′			″
Decl. S	41	32·3		—— S	12·70

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	224·2	...	5·9	...	1835·94

A double star. A 7, white; B 9½, yellow. Precedes γ Lupi, a star of mag. 3, by 4^{m}, and ¾° to the S.

1039. 17 B. CORONÆ BOREALIS. (Σ. 1950.)

	h.	m.	s.		s.
R. A.	15	25	15	Prec. +	2·56
	°	′			″
Decl. N	25	53·4		—— S	12·54

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	93·1	...	3·2	...	1830·28
DAWES	92·8	...	3·2	...	1849·44
MAIN	92·8	...	3·7	...	1865·68
GLEDHILL	93·4	...	3·4	...	1871·36

A double star. A 7, golden; B 8½, blue.

1040. 91 P. XV. LIBRÆ. DXLVI.

R.A.	15h 25m 24s	Prec. +	3s·44
Decl.	S 19° 47′·3	—— S	12″·52

	Position.	Distance.	Epoch.
	°	″	
South	283·2	11·4	1825·35
Smyth	282·6	11·8	1832·48
Main	283·8	10·5	1861·45
Stone, O.	280·3	11·3	1878·47

A neat double star, in the space between the *chelæ* of Scorpio, and 9° due W. of β. A $7\frac{1}{2}$, bluish white; B 9, smalt blue; with two or three minute stars in the field.

["9 very small, 1852."—*Webb.*]

1041. 3607 h. LUPI. (H. 4108.)

R. A.	15h 27m 29s	Prec. +	4s·33
Decl.	S 50° 17′·5	—— S	12″·38

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; c B; p L; R; vglb M; rrr; st 16;" which means:—"a globular cluster; considerably bright; pretty large; round; very gradually less bright in the middle; easily resolveable—clearly seen to consist of stars, which are of the 16th magnitude."

1042. γ LUPI.

R. A.	15h 27m 48s	Prec. +	3s·96
Decl.	S 40° 48′·0	—— S	12″·36

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	94·1	0·84	1875·55

A double star. A 4; B 4.

1043. 99 P. XV. (f) LUPI. (*h. 4788.)

R. A.	15h 28m 18s	Prec. +	4s·08
Decl.	S 44° 35′·5	—— S	12″·33

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	349·0	3·1	1836·52

A double star. A 5; B $8\frac{1}{2}$.

1044. δ SERPENTIS. (Σ. 1954.) DXLVII.

	h.	m.	s.			s.
R. A.	15	29	33	Prec.	+	2·86
		°	′			″
Decl.	N	10	54·5	——	S	12·24

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	199·2	3·05	1821·33
Smyth	196·5	2·9	1831·43
Smyth	196·2	2·8	1842·35
Dawes	194·2	3·03	1852·58
Dembowski	192·2	3·20	1863·43
Main	190·4	3·18	1872·39
Jedrzejewicz	190·5	3·48	1880·54

An elegant double star, in the bend of the Serpent's neck; where it forms a component of the Arabian *Nasaḳ Yemání*, or southern boundary of the pasturage, cited under α Serpentis, from which it bears N. by W., distant 5°. A 3, bright white; B 5, bluish white; but under the very best vision, both have a bluish tinge, which, in such a pair, is rather against the theory of contrast.

[This star is undoubtedly in movement, but its circumstances are enveloped in much obscurity.]

1045. α CORONÆ BOREALIS. DXLVIII.

	h.	m.	s.			s.
R. A.	15	30	2	Prec.	+	2·52
		°	′			″
Decl.	N	27	5·1	——	S	12·21

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	214·5	11·6	1834·51

A *Nautical Almanac* star, with a distant companion, in the front centre of the Northern Crown; where it is known as Gemma, or the precious stone of the diadem. A 2, brilliant white; B 8, pale violet; and there is a very neat little double star nearly preceding A by $48{\cdot}3^{s}$, on the angle = 275°, between which and A, in nearly mid-distance, is a red star of the 10th magnitude.

[Knott on various occasions in 1862 and 1863 saw this so-called "red star," but it was never above mag. 13 or 14 of Smyth's scale, and much too small for any distinct colour to be assignable.]

Gemma does not seem to have been a name known to the ancients, though the astral genealogists are fain to derive it from the "Gemmasque novem transformat in ignes" of Ovid. The star however was honoured as *Ashtaroth*, the Syrian Venus, as *Ariadne*, as *Gnossia stella*, as *Clara* *stella*, and other designations, from the earliest times. When the Arabians boarded Ptolemy, and clouded his λαμπρὸς, there was no end of the epithets given to *α* Coronæ Borealis; and the whole tribe of commentators, glossators, scholiasts, etymologists, and lexicographers have been thrown into fault. Its most usual name in the Catalogues is Alphecca, from *al fekkah*, the dervish's cup or platter, from the said break in the ring of stars. To find this by alignment, place *ζ* and *η*, the two last stars in the Greater Bear's tail, in a direction following, and they will point upon the seven stars of the Northern Crown in the S.E., where *α* shines conspicuous enough; or it may be picked up at one-third of the distance, and on the line, from *α* Boötis to *α* Lyræ. And the salt-water poet points out another method:

> From *epsilon* in Virgo's side Arcturus seek, and stem,
> And just as far again you'll spy Corona's beauteous gem:
> There no mistake can well befall e'en him who little knows,
> For bright and circular the Crown conspicuously glows.

Στέφανος βόρειος, the Northern Crown, is one of the old 48 constellations, and though small, possesses some very interesting double stars and nebulæ. A table of the comparative lustre of the components will be found in *Phil. Trans.*, 1797, p. 315; and their number has thus risen under increased optical application:

Ptolemy . . .	8 stars.	Flamsteed . . .	21 stars.
Bayer	20 „	Bode	87 „

1046. 178 B. LIBRÆ. (Σ. 1962.)

	h.	m.	s.			s.
R. A.	15	32	43	Prec. +		3·22
		°	′			″
Decl.	S	8	26·0	—	S	12·06

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	187·1	...	11·8	...	1830·54
MAIN	188·9	...	11·6	...	1864·41
BURNHAM	187·8	...	11·9	...	1878·48

A double star. A 6½, white; B 6½, white. These stars are evidently an optical pair only.

1047. 1964 Σ. CORONÆ BOREALIS.

	h.	m.	s.			s.
R. A.	15	34	3	Prec. +		2·27
		°	′			″
Decl.	N	36	36·0	—	S	11·92

	Position.		Distance.		Epoch.
	°		"		
STRUVE, W.	A B 86·0	...	15·3	...	1830·87
BURNHAM	A B 88·1	...	15·5	...	1878·38
	B C 10·0	...	1·34		

A triple star. A 7½, yellowish; B 8, yellowish; C 9½.

1048. ζ CORONÆ BOREALIS. (Σ. 1965.) DXLIX.

R. A. 15h 35m 14s | Prec. + 2s·26

Decl. N 36° 59′·7 | —— S 11″·84

	Position.		Distance.		Epoch.
	°		"		
HERSCHEL, W.	295·8	...	5·4	...	1779·76
HERSCHEL, J., and SOUTH	300·9	...	7·1	...	1822·30
SMYTH	301·2	...	6·1	...	1842·57
MÄDLER	302·8	...	6·1	...	1861·32
GOLDNEY	301·4	...	6·3	...	1878·51

A fine double star, in the middle of the space over the wreath, and 10° N., a little easterly, from *a*. A 5, bluish white; B 6, smalt blue. This is a beautiful object.

A splendid set of measures at Hartwell rendered it still more evident that these stars are optical, and relatively at rest.

1049. π^1 URSÆ MINORIS. (Σ. 1972.)

R. A. 15h 35m 35s | Prec. — 3s·8

Decl. N 80° 48′·3 | —— S 11″·82

	Position.		Distance.		Epoch.
	°		"		
STRUVE, W.	82·9	...	30·1	...	1832·60
STONE, O.	82·7	...	30·8	...	1878·81

A double star. A 6, yellowish; B 7, yellowish.

1050. 764 H. II. DRACONIS. (h. 1934; H. 4128.) DL.

R. A. 15h 36m 25s | Prec. + 1s·21

Decl. N 59° 42′·2 | —— S 11″·76

A small round nebula, in the centre of Draco's body, being one of those mentioned above as following ι Draconis. This object is pale but distinct. There are several stars in the field, of which one of the 10th magnitude precedes pretty close to the nebula, and a brighter one follows near the parallel. It bears E. by N. of and is about 1½° distant from ι Draconis.

[My R. A. is from D'Arrest.]

1051. 3610 h. CIRCINI. (H. 4125.)

		h.	m.	s.			s.
R. A.		15	37	24	Prec.	+	5·01
			°	′			″
Decl.	S		60	52·3	——	S	11·69

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; ○; pF; vS; R; r? am 150 st;" which means:—"a remarkable object; a planetary nebula; pretty faint; very small; round; doubtful whether it is resolveable; it lies in the midst of a group of about 150 stars." Engraved, *Cape Obs.*, Pl. vi. Fig. 7.

1052. 6477 Lac. TRIANGULI AUSTRALIS.

		h.	m.	s.			s.
R. A.		15	37	50	Prec.	+	5·37
			°	′			″
Decl.	S		65	5·9	——	S	11·65

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	155·9	2·42	1835·35

A double star. A 7; B 7.

1053. γ CORONÆ BOREALIS. (Σ. 1967.) DLI.

		h.	m.	s.			s.
R. A.		15	38	7	Prec.	+	2·52
			°	′			″
Decl.	N		26	38·7	——	S	11·64

	Position.	Difference of R. A.	Epoch.
	°	s.	
Smyth	A C 88·7	14·5	1839·69

	Position.	Distance.	Epoch.
	°	″	
Smyth	A B *round*	*round*	1834·66
Struve, O.	A B 292·5	0·41	1843·30
Struve, O.	A B 290·0	0·42	1850·51
Struve, O.	A B 287·7	0·42	1861·89
Spörer	A B *round*	*round*	1875·98
Burnham	A B *round*	*round*	1880·56

A most difficult binary star, with a distant companion, in the middle of the lower side of the wreath; where it follows α Coronæ a little S. of the parallel, at about 2½° distance. A 6 (but certainly looking very much brighter), flushed white; B, uncertain; C 10, pale lilac. This is the præses of Σ.'s "vicinissimæ," being pronounced by him as closer and more troublesome than ζ Herculis. In 1832 Sir J. Herschel examined it with the 20^{ft} reflector and eye-pieces magnifying 320, 480, and 600 times, and under each saw but a round disc without any companion. My attacks, therefore, under various powers, were attended with a similar result. But previous to dismantling my equatorial, I took advantage of a superb night, 7th September, 1839, and after much gazing, became *almost* assured that it was really elongated in a direction *sp* and *nf;* the which was so different from what Σ. had registered, that I ventured at once to receive it as a physical object and a binary system.

As usual, my magnitude of γ Coronæ is received from the Palermo Catalogue, otherwise its brilliance would be placed considerably higher. Ptolemy rated it δ, a size followed by Tycho Brahé, Hevelius, and Flamsteed. But may not the apparent differences be owing to the actual duplicity and orbital action of the star?

[Many as have been the attempts made to secure good measures of this star, the results have been most unsatisfactory, owing to the nearness of the components. Doberck in 1877 published elements which assign a period of 95^{y}.]

1054. 552 Dunlop LUPI. (h. 3611; H. 4132.)

	h.	m.	s.		s.
R. A.	15	38	50	Prec. +	3·90
		°	′		″
Decl.	S	37	25·2	—— S	11·58

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; ⊕; v B; L; R; vgb M; st 13 . . . 15;" which means:—"a remarkable object; a globular cluster; very bright; large; round; very gradually brighter in the middle; the component stars vary from the 13th to the 15th magnitudes."

1055. α SERPENTIS. (*h. 1277.) DLII.

	h.	m.	s.		s.
R. A.	15	38	51	Prec. +	2·94
		°	′		″
Decl.	N	6	46·3	—— S	11·58

	Position.	Distance.	Epoch.
	°	″	
Lamont	359·7	61·5	1830 ±
Burnham	353·2	58·7	1879·39

A *Nautical Almanac* star with a minute *comes,* on the heart of the Serpent. A 2½, pale yellow; B 15, fine blue, followed a little S. of the parallel, at about 25^{s} Δ R. A., by a telescopic star.

This star appears in the Catalogues as Unukalhay, from *'unḳ-al-ḥayyah*, the serpent's neck. It is the Cor Serpentis of astrologers; and doubtless the *lucidus anguis*, one of the stormy warnings of the *Georgics*. It may be found by being looked for at nearly mid-distance between α Coronæ Borealis and α Scorpii; or the galley-poet may be called in:

> To strike th' insidious Serpent's heart, a line from Altair wield,
> From thence below Ras Alague, across th' Arabian Field;
> And when as far again you've reached, as those two stars may be,
> The middle one of three fair gems, Serpentis Cor you'll see.

The Serpent is one of the ancient 48 constellated groups, and is large, as its windings bring it in contact with Ophiuchus, Aquila, Libra, and Hercules; the head and neck, which are directly under the Crown, are marked by some interesting stars, and the tail terminates in a splashy part of the Galaxy. The Greeks distinguished the Dragon, the Snake, and the Water-snake by the distinctive epithets Δράκων, Ὄφις, and Ὕδρη, but the Latins used only *Anguis* and *Serpens* for the whole three. The Arabians termed it *Ḥuweyyah*, the snake; but they had also a great configuration around this spot.

Serpens is astronomically, though not mythologically, distinguished from its bearer; and is held to be emblematic of prudence and vigilance. Its constituents have been thus enumerated:

Ptolemy	18 stars.	Bayer	37 stars.
Copernicus	18 ,,	Hevelius	22 ,,
Tycho Brahé	13 ,,	Flamsteed	64 ,,
Kepler	26 ,,	Bode	187 ,,

1056. β SERPENTIS. (Σ. 1970.) DLIII.

		h.	m.	s.		s.
R. A.		15	41	6	Prec. +	2·76
		°	′			″
Decl.	N	15	46·1		—— S	11·43

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	265·0	30·6	1832·14
Struve, W.	265·5	30·7	1851·80

A delicate double star, on the Serpent's under-jaw; it is 12° S. by E. of α Coronæ Borealis. A 3½, and B 10, both of a pale blue tint, and there is a distant telescopic star, also blue, in the *sp* quadrant.

1057. 343 Dunlop LUPI. (h. 3612; H. 4141.)

		h.	m.	s.		s.
R. A.		15	43	28	Prec. +	4·71
		°	′			″
Decl.	S	56	8·3		—— S	11·25

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; L; p Ri; st 12 ... 14;" which means:—"a cluster; large; pretty rich; the component stars vary from the 12th to the 14th magnitudes."

1058. 4809 *h. TRIANGULI AUSTRALIS.

	h. m. s.		s.
R. A.	15 43 28	Prec. +	4·96
Decl.	S 60° 20′·4	—— S	11″·26

		Position.		Distance.		Epoch.
HERSCHEL, J.	A B	50°·9	...	43″·4	...	1836·24
	A C	257·0	...	49·3		

A triple star. A 7; B 9; C 9.

1059. π^2 URSÆ MINORIS. (Σ. 1989.)

	h. m. s.		s.
R. A.	15 45 37	Prec. —	3·66
Decl.	N 80° 20′·0	—— S	11″·10

	Position.		Distance.		Epoch.
STRUVE, W.	24°·1	...	0″·71	...	1832·68
SECCHI	21·1	...	0·60	...	1858·59
DEMBOWSKI		*single*		...	1865·00

A close double star. A 7½; B 9, both very white.

1060. 39 SERPENTIS. DLIV.

	h. m. s.		s.
R. A.	15 48 5	Prec. +	2·80
Decl.	N 13° 33′·1	—— S	10″·92

A 7th mag. star, at the back of the Serpent's head, and about 7° distant from its own *lucida*, on a N.N.E. line.

39 Serpentis has been suspected of variability, and was even mistaken for Harding's variable star, which is 2° *nf* of it. It is marked as of the 6th magnitude in the British Catalogue; "but," says Baily, "in the *original* entry, it is designated of the 6½, which I have therefore retained."

1061. 1984 Σ. DRACONIS.

	h. m. s.		s.
R. A.	15 48 16	Prec. +	1·56
	° ′		″
Decl.	N 53 14·0	—— S	10·91

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	273·8 ...	6·5 ...	1830·72
Mädler	274·3 ...	6·5 ...	1843·42
Secchi	276·2 ...	6·4 ...	1857·61
Dunér	276·2 ...	6·4 ...	1870·90

A double star. A 6½, white; B 9, white. On the confines of Hercules.

1062. ξ LUPI.

	h. m. s.		s.
R. A.	15 49 52	Prec. +	3·81
	° ′		″
Decl.	S 33 38·9	—— S	10·79

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	49·3 ...	11·0 ...	1835·65

A double star. A 6; B 6½.

1063. 220 P. XV. SERPENTIS. (Σ. 1987.) DLV.

	h. m. s.		s.
R. A.	15 51 44	Prec. +	2·99
	° ′		″
Decl.	N 3 43·5	—— S	10·69

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	320·2 ...	12·4 ...	1783·18
Struve, W.	324·0 ...	10·2 ...	1831·91
Smyth	324·7 ...	10·5 ...	1834·35
Main	323·3 ...	10·8 ...	1862·37

A neat double star, on the Serpent's back; it is about 5° from *α*, on a S.E. by S. line, which passes ϵ in nearly mid-distance. A 8, white; B 9, grey; this appeared red to H., who remarks that probably a "dry fog" at the time of observation had tinged it. A comparison of the several series of measures of this star shows a slight increase of angle, which may as likely be owing to *personal equation* as to motion; but still the results are remarkably coincident.

1064. η LUPI.

	h.	m.	s.			s.
R. A.	15	52	50	Prec.	+	3·95
		°	′			″
Decl.	S	38	5·1	——	S	10·56

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	22·2	...	15·0	...	1834·64

A double star. A 4; B 8½, blue. The estimates of magnitude vary thus:—Gould, 3·7; Lacaille, 4; Ellery, 4½; Behrmann, 5.

1065. 304 Dunlop TRIANGULI AUSTRALIS.

(h. 3516; H. 4153.)

	h.	m.	s.			s.
R. A.	15	54	22	Prec.	+	5·05
		°	′			″
Decl.	S	60	11·3	——	S	10·45

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; v L; p Ri; l C; st 7;" which means:—"a cluster; bright; very large; pretty rich; little condensed; some of the stars are of the 7th magnitude."

1066. ι^1 NORMÆ. (*h. 4825.)

	h.	m.	s.			s.
R. A.	15	54	34	Prec.	+	4·82
		°	′			″
Decl.	S	57	27·6	——	S	10·44

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	251·6	...	10·2	...	1836·61

A double star. A 6; B 9½.

1067. T CORONÆ.

	h.	m.	s.			s.
R. A.	15	54	53	Prec.	+	2·51
		°	′			″
Decl.	N	26	14·0	——	S	10·41

This is the celebrated star which blazed forth suddenly in May 1866, and caused such a sensation in the astronomical world. It was seen by Mr. J. Birmingham at Tuam on May 12, as a star of mag. 2; Schmidt at Athens on May 13 saw it as a 2½ mag.; on the same evening Courbebaisse at Rochefort also observed it; and on subsequent evenings several other astronomers independently detected it. It diminished in brightness for several days at the rate of about ½ a magnitude a day, but towards the end of May the decrease was much less rapid. By June 7 it had fallen to mag. 9. During the autumn it brightened a little up to about the 7th magnitude. Subsequent research revealed the fact that the star had been catalogued by Argelander as of mag. 9½. Courbebaisse is of opinion that it could not have been conspicuous to the naked eye on May 11, and he was confident that such was not the case on May 9. Baxendell also was confident that the star was not sufficiently bright to attract attention with the naked eye on May 7. There seems no doubt that this star is a long-period variable, but the extraordinary suddenness and extraordinary intensity of the outburst of light in May 1866 are quite without a parallel. Huggins described the spectrum as very remarkable, and involving the necessity of supposing its physical condition to be altogether unique. He found the star's light to be compound, and to emanate from two different sources, each source of light yielding its own special spectrum. The principal spectrum was analogous to that of the Sun. The subordinate spectrum seemed to be superposed upon the one previously described and to consist of 5 bright lines, and therefore to be of gaseous origin. (*Month. Not.*, *R. A. S.*, vol. xxvi. pp. 275 and 297.)

1068. ξ SCORPII = 51 LIBRÆ. (Σ. 1998.) DLVIII.

		h.	m.	s.			s.
R. A.		**15**	**58**	**19**	Prec.	+	3·29
		°	′				″
Decl.	**S**	**11**	**4·1**		——	S	10·15

		Position.		Distance.		Epoch.
		°		″		
Herschel, W.	A B	7·9	...	1·50	...	1782·36
	A C	88·6	...	6·38	...	1780·39
Smyth	A B	6·6	...	1·4	...	1834·42
	A C	76·1	...	7·2		
Jedrzejewicz	A B	182·5	...	1·2	...	1877·54
	A C	72·6	...	7·1		
Stone, O.	A B	186·9	...	1·30	...	1879·41

A fine triple star, between the upper *lanx* Libræ and the right leg of Ophiuchus, above the upper or left *chela* of Scorpio; and it is 16° from Antares, on a line running N.N.W. from that star to α Serpentis. In this I am particular, because Flamsteed designated it ξ Libræ, thinking he thereby followed Bayer; whereas in fact this star is ξ Scorpii; which he says is "in origine forficis, seu forficulæ, Barbari graffias vocant:" it consequently ought not to have been jumbled into the Balance. The components are, A 4½, bright white; B 5, pale yellow; and C 7½, grey; and there is a neat small pair of stars in the *np* quadrant, whence H., who did not at first perceive the duplicity of A, called the whole a double-double star.

There is some remarkable anomaly respecting A and B, which it is difficult to account for, since the comparative steadiness of the distance indicates a circular orbit, constantly showing both components to us, at a similar distance. Now H. and S. observing this object on the 18th June, 1822, when their measures of A and C "were extremely satisfactory," and guarded before-hand by H.'s remarks, could not see the large star double. [Doberck has assigned to AB a period of $95{\cdot}9^{y.}$]

[The pair of 8 mag. stars 11″ apart, which lie to the *sf* of this object, form Σ. 1999.]

1069. β SCORPII. DLIX.

	h.	m.	s.			s.
R. A.	**15**	**59**	**2**	Prec.	+	3·48
		°	′			″
Decl.	**S**	**19**	**30·2**	——	S	10·10

		Position.		Distance.		Epoch.
		°		″		
Herschel, W.	A C	25·1	...	14·3	...	1779·72
Smyth	A C	24·9	...	13·1	...	1835·39
Main	A C	26·7	...	13·1	...	1868·46
Burnham	A B	88·4	...	0·91	...	1880·06
	A C	24·4	...	13·5	...	1879·52

A *Nautical Almanac* star with a companion, at the root of the upper hand-claw. A 2, pale white; B 10; C 5½, lilac tinge; and the two point nearly to a 5th magnitude star in the *nf* quadrant. The components are sometimes marked β^1 and β^2.

The components have been pretty constant, and the object must therefore be assigned to the optical class. [Burnham discovered the duplicity of A in 1879.]

Though only the second star of the asterism, β Scorpii has obtained the designation of Acrab, or Scorpion, in the Catalogues. It may be readily found by running a line from α Lyræ S. between α Herculis and α Ophiuchi, and equally far beyond, where it will hit upon β Scorpii, which is the northern of the 3 stars just named, and whence it may also be recognised; or resorting to the rhymer's advice, his rule runs thus:

> From Virgo's spike to east-south-east, direct th' inquiring eye;
> You'll pass between the Scale's bright stars to where Iklil doth lie.

1070. 359 Dunlop NORMÆ. (h. 3618; H. 4155.)

		h.	m.	s.			s.
R. A.		15	59	2	Prec.	+	4·64
			°	′			″
Decl.	S		53	43·6	——	S	10·10

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“Cl; S; mC; st 11 . . . 14;” which means:—“a cluster; small; much condensed; the component stars vary from the 11th to the 14th magnitudes.”

1071. 2007 Σ. SERPENTIS.

		h.	m.	s.			s.
R. A.		16	0	55	Prec.	+	2·79
			°	′			″
Decl.	N		13	37·0	——	S	9·96

	Position. °	Distance. ″	Epoch.
Herschel, J., and South	328·7	31·9	1823·42
Struve, W.	328·2	31·9	1830·14
Mädler	328·5	33·0	1843·45
Jedrzejewicz	326·9	33·7	1877·00

A double star. A 7, yellowish white: B 8½, white. The distance is increasing.

1072. 6706 Lac. SCORPII.

		h.	m.	s.			s.
R. A.		16	2	32	Prec.	+	3·80
			°	′			″
Decl.	S		32	21·2	——	S	9·84

	Position. °	Distance. ″	Epoch.
Herschel, J.	86·3	15 *est.*	1837·50

A double star. A 7; B 7.

1073. κ^1 HERCULIS. (Σ. 2010.) DLX.

		h.	m.	s.			s.
R. A.		16	3	6	Prec.	+	2·70
			°	′			″
Decl.	N		17	20·6	——	S	9·80

	Position. °	Distance. ″	Epoch.
Herschel, W.	10·4	39·9	1779·72
Struve, W.	9·5	31·4	1822·69
Struve, O.	10·3	30·6	1852·55
Doberck	9·9	29·8	1877·35

A neat double star, on the Hero's left elbow; about 30° distant from *α* Lyræ, in the W.S.W., where it is nearly mid-way between *γ* Herculis and *β* Serpentis. A 5½, light yellow; B 7, pale garnet.

There is strong presumption that the angle of position has remained stationary. There may, however, have been a diminution of distance, especially if the operations of Flamsteed, 132 years before mine, are to be relied on.

[O. Struve finds the motion to be certainly rectilinear. Colours, according to Webb, "pale yellow; reddish yellow."]

1074. 360 Dunlop NORMÆ. (h. 3619; H. 4162.)

		h.	m.	s.			s.
R. A.		16	4	39	Prec.	+	4·67
Decl.	S	53°	55′·6		——	S	9″·67

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v B; v L; v Ri; l C; st 10;" which means:—"a cluster; very bright; very large; very rich; little condensed; the stars are chiefly of the 10th magnitude."

1075. *ν* SCORPII. (*β* 120.) DLXI.

		h.	m.	s.			s.
R. A.		16	5	36	Prec.	+	3·47
Decl.	S	19°	10′·3		——	S	9″·60

		Position.	Distance.	Epoch.
Herschel, J., and South		338°·2	40″·8	1821·37
Smyth	A C	336·8	40·8	1851·38
	C D	45·0	1·5	
Stone, O.	A B	0·2	0·74	1879·03
	C D	45·2	2·07	1879·41

A quadruple star, at the root of the upper or northern hand-claw. It lies E. by N. from *β* Scorpii, at about 2° distance. A 4, bright white; [B 5½]; C 7, pale lilac; [D 8].

1076. 2017 Σ. SERPENTIS.

		h.	m.	s.			s.
R. A.		16	7	4	Prec.	+	2·76
Decl.	N	14°	50′·4		——	S	9″·48

	Position.	Distance.	Epoch.
Struve, W.	249°·7	25″·03	1831·42
Jedrzejewicz	252·2	25·7	1877·04

A double star. A 8, yellowish; B 8½, white.

1077. 49 SERPENTIS. (Σ. 2021.) DLXII.

	h. m. s.			s.
R. A.	16 8 10	Prec.	+	2·78
Decl.	N 13° 49′·8	——	S	9″·40

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	311·9	...	4·15	...	1823·28
SMYTH	318·1	...	3·3	...	1839·29
MÄDLER	322·2	...	3·39	...	1851·40
DOBERCK	327·4	...	3·90	...	1876·25
JEDRZEJEWICZ	330·3	...	3·81	...	1877·50

A close double star, which, though pertaining to the Serpent, is absurdly placed on the left arm of Hercules. A 7, pale white; B 7½, yellowish. This is a fine and tolerably easy object, therefore its measures are entitled to confidence.

A rough investigation of the whole, gives above 600 years for the orbital revolution of the *satellite* about its primary,—or rather, of one sun around the other. More observations at longer epochs are, however, necessary, before it can actually be pronounced a binary system. Indeed, as improved methods and means are progressively applied, various suspected movements will be decisively confirmed or rejected, results more exact obtained, and the vague allowances for *personal equation* destroyed. Meantime he who wishes to fish the object up, may find it at the distance of 10½° to the N.E. of *a* Serpentis, on the line leading from thence to *a* Lyræ.

[Dawes and Secchi were both of the opinion that orbital motion was certain in the case of this object, but no attempt to ascertain the character of the orbit appears to have been made since Smyth's time.]

1078. 2022 Σ. CORONÆ BOREALIS.

	h. m. s.			s.
R. A.	16 8 18	Prec.	+	2·47
Decl.	N 26° 57′·4	——	S	9″·40

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	129·5	...	2·77	...	1830·56
MÄDLER	131·2	...	2·89	...	1844·36
SECCHI	136·5	...	2·40	...	1858·09
STRUVE, O.	138·7	...	2·78	...	1868·50
BURNHAM	136·4	...	2·89	...	1878·44

A double star. A 6½, very white; B 11. An increase in the angle seems certainly to be in progress, but the distance appears unchanged.

1079. 326 Dunlop NORMÆ. (h. 3622; H. 4170.)

		h.	m.	s.			s.
R. A.		16	9	43	Prec.	+	4·93
			°	′			″
Decl.	S		57	37·4	——	S	9·47

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; L; l C; st 7 . . 10;" which means:—"a cluster; bright; large; little condensed; the component stars vary from the 7th to the 10th magnitudes."

1080. 80 M. SCORPII. (h. 3624; H. 4173; ℞.) DLXIV.

		h.	m.	s.			s.
R. A.		16	10	26	Prec.	+	3·56
			°	′			″
Decl.	S		22	43·2	——	S	9·22

A compressed globular cluster of very minute stars, on the right foot of Ophiuchus, which is on Scorpio's back. This fine and bright object was registered by Messier in 1780, who described it as resembling the nucleus of a comet; and indeed, from the blazing centre and attenuated disc, it has a very cometary aspect. There are some small stars both above and below its following parallel, of which three of those in the *nf* form a coarse triangle; but the field and the vicinity are otherwise barren. An early star of Ophiuchus, No. 17, P. XVI., slightly precedes this splendid conglomerate, about ½° to the N., and though only of the 8th magnitude, is a convenient index of its approach. From δ Scorpii it lies E., at 4° distance; and is midway between *α* and *β* Scorpii.

This is a very important object when nebulæ are considered in their relations to the surrounding spaces, which spaces, Sir W. Herschel found, generally contain very few stars: so much so, that whenever it happened, after a short lapse of time, that no star came into the field of his instrument, he was accustomed to say to his assistant, "Make ready to write, Nebulæ are just approaching." Now our present object is located on the western edge of a vast obscure opening, or space of 4° in breadth, in which no stars are to be seen; and Sir William pronounces 80 Messier, albeit it had been registered as *nébuleuse sans étoiles*, to be the richest and most condensed mass of stars which the firmament can offer to the contemplation of astronomers. See also 4 M. (No. 1089, *post*).

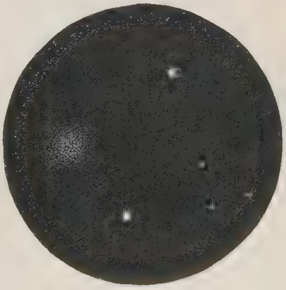

Fig. 32. 80 M. Scorpii.

[Webb queries the accuracy of the statement that near this nebula there is a large starless opening.]

[Three of the stars in the field engraved above are the well-known variables R, S, and T Scorpii, discovered to be such by Chacornac in 1853 and 1854 respectively, and by Auwers in 1860. R varies from mag. 9 to below 13 in 223 days; S from mag. 9 to below 13 in 177 days; and T from mag. 7 to below 13 in a period which is at present uncertain. Auwers's star is the one lettered *f* in the engraving.]

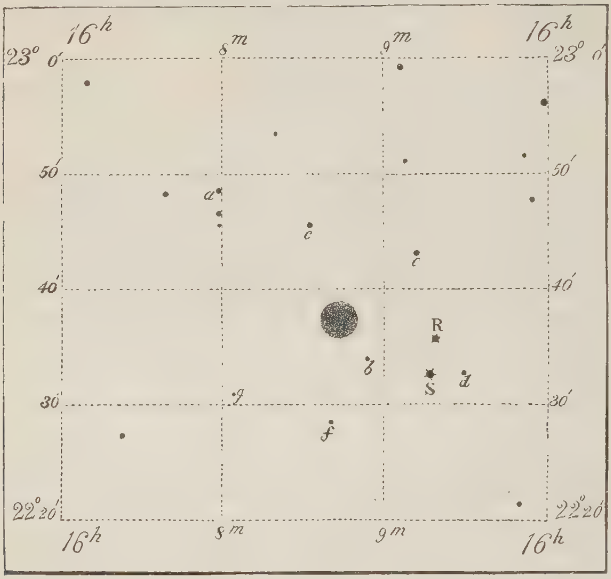

Fig. 33. Variable Stars near 80 M. Scorpii. (Epoch, 1860).

[A strange history is attached to this nebula, the import of which remains to be ascertained. Being in the same field with R and S Scorpii it had frequently come under the notice of Pogson, who had always seen it as a well-defined *nebula*. On May 28, 1860, when seeking for these 2 variables, neither of which was then visible, his attention was arrested by the startling fact that the place of the nebula was occupied by a star of about mag. 7. So recently as May 9 he saw the nebula, and is positive that it appeared as usual, without anything stellar. The same instrument and power were employed on both occasions. On June 10 the stellar appearance had nearly vanished, but the cluster still shone with unusual brilliancy and with a marked central condensation. Pogson's observations were fully confirmed by E. Luther and Auwers. It is to be presumed that the 7th mag. star mentioned above was a variable one of long period, whose sudden apparition and brilliancy while it lasted led to the light of the cluster being quite overpowered. No later observations to the like effect have been obtained.]

1081. σ CORONÆ BOREALIS. (Σ. 2032.) DLXV.

R. A.	$16^{\mathrm{h.}}$ $10^{\mathrm{m.}}$ $34^{\mathrm{s.}}$	Prec.	+ $2^{\mathrm{s.}}{\cdot}26$
Decl.	N 34° $8'{\cdot}2$	——	S $9''{\cdot}21$

		Position.		Distance.		Epoch.
Herschel, J., and South	A B	71°·5	...	1″·44	...	1822·83
Smyth	A B	107·6	...	1·3	...	1830·76
Dawes	A B	147·8	...	1·65	...	1840·57
Mädler	A B	173·0	...	2·23	...	1850·70
Struve, O.	A B	186·8	...	2·72	...	1860·74
Dembowski	A B	196·9	...	3·09	...	1870·43
Jedrzejewicz	A B	201·6	...	3·61	...	1877·53
	A C	88·4	...	55·61		

A binary and triple star, between the Wreath and the left thigh of Hercules, 10° distant from and N.E. of *a* Coronæ, and a little more than half-way between that star and η Herculis. A 6, creamy white; B 6½, smalt blue; D 11, dusky blue; and a fourth star, C, of the 13th magnitude, was seen by H. in the 20ft reflector, in the *sp* quadrant, at about 20″. [Hall gives A C Pos. 221·7°; Dist. 15·9″; Epoch 1876·40.]

This very interesting object is a binary, and has been found to have a rapid direct orbital motion, which has been accelerating since the year 1800. When H. and S. examined it in 1821, this accelerated velocity was detected, since the first interval of twenty-one years gave a mean of 1° per annum; and the following interval of seventeen years showed an augmentation to 2·2°; and from thence, by an almost sudden start, it was supposed to have increased to 6·9° per annum. This, however, was not verified by Sir J. South's observations of 1825; but the accelerated velocity from that date may be seen by inspecting the various measures,—and it should be added, that the rotatory motion continues in the direction assigned by H., and supports his hypothesis.

[Several computers have investigated the orbit of σ Coronæ, but the results are very discordant. Whilst Jacob found a period of only 195^{y}, Doberck in 1875 fixed it at 843^{y}. The other results are all intermediate between these.]

From the steadiness of the little star C, it may be concluded to have only an optical affinity with A and B; and H̶. says, "The great number of small stars in the neighbourhood is not favourable to a supposed connection between any of them and σ Coronæ." [Gledhill calls Smyth's C, D, and Gledhill's C is the little star. The estimates of the colours and of the magnitudes of A and B vary very much.]

1082. υ CORONÆ BOREALIS. DLXVI.

R. A.	$16^{\mathrm{h.}}$ $12^{\mathrm{m.}}$ $20^{\mathrm{s.}}$	Prec.	+ $2^{\mathrm{s.}}{\cdot}40$
Decl.	N 29° $27'{\cdot}5$	——	S $9''{\cdot}08$

		Position.	Distance.	Epoch.
		°	″	
Herschel, J., and South	A B	24·4	88·6	1823·36
	A C	54·8	126·4	
Burnham	A B	22·5	86·4	1879·34
	A C	52·3	123·3	
	B D	223·4	13·4	
	A a	29·2	55·3	

A quadruple star, in the space between the Wreath and the back of Hercules; it is about 9½° distant from α Coronæ on an E. by N. bearing, and in a line between α Serpentis and η Herculis. A 6, [a 12], B 10, C 9, and D 13. It was measured as triple by H. and S.; but B, which is the apex of the obtuse-angled triangle formed by the group, has a little companion overlooked by those astrometers, although duly notified by the eagle-eyed ♅.

1083. 68 Dunlop APODIS. (h. 3623; H. 4175.)

R. A.	**16h 13m 15s**	Prec.	+ 6s·72
Decl.	**S 71° 56′·4**	——	S 9″·00

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; p F; L; i R; vgb M; rrr; st 14 . . . ;" which means:—"a globular cluster; pretty faint; large; irregularly rich; very gradually brighter in the middle; easily resolveable—clearly seen to consist of stars; the stars are from the 14th magnitude downwards."

1084. 48 P. XVI. SCORPII. DLXVII.

R. A.	**16h 14m 3s**	Prec.	+ 3s·49
Decl.	**S 19° 51′·0**	——	S 8″·95

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	27·1	15·4	1783·22
Herschel, J., and South	20·5	13·2	1823·45
Smyth	21·5	13·9	1831·39
Main	20·1	13·1	1862·45

A neat double star, above the Scorpion's head. A 8, dull white; B 9, flushed; and there is a wide pair of stars in the *np* quadrant of similar magnitudes with these. This object lies just 4° to the E. of β Scorpii, [or 1° *p* ψ Ophiuchi of mag. 4].

Sensible diminution of distance was inferred; but the later observations imply a relative fixity.

The other pair above alluded to are Nos. 44 and 45 P. XVI.; they bear from this object on an angle of 124°, about 7′ distant, lying in a position of 330°, and 45″ apart.

1085. σ SCORPII. DLXVIII.

	h.	m.	s.			s.
R. A.	16	14	30	Prec.	+	3·63
		°	′			″
Decl.	S	25	19·7	——	S	8·91

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	271·2	20·6	1822·43
Smyth	271·6	20·5	1838·32
Stone, O.	273·0	20·4	1879·25

A delicate double star, in the middle of Scorpio's body, and about 2° distant W. by N. from Antares. A 4, creamy white; B $9\frac{1}{2}$, lilac tint.

σ Scorpii precedes Antares, which is followed at nearly the same distance by τ, whence the Arabians termed σ and τ *Al-niyát*, the præcordia, or outworks of the heart. They will be readily distinguished by taking up Antares.

1086. 3625 h. NORMÆ. (H. 4179.)

	h.	m.	s.			s.
R. A.	16	15	59	Prec.	+	4·59
		°	′			″
Decl.	S	51	41·2	——	S	8·79

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; eL; eRi;" which means:—"a cluster; extremely large; extremely rich." In the *Cape Obs.* the following remarks are put against this object:—"a part of the Milky Way, so immensely rich as to be one vast cluster of clusters."

1087. 5708 Brisb. NORMÆ. (*h. 4845.)

	h.	m.	s.			s.
R. A.	16	16	10	Prec.	+	4·10
		°	′			″
Decl.	S	40	58·7	——	S	8·78

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	135·0	1·20	1836·47

A double star. A $7\frac{1}{2}$; B $8\frac{1}{2}$.

1088. 6815 Lac. SCORPII. (*h. 4848.)

	h.	m.	s.			s.
R. A.	16	16	51	Prec.	+	3·84
		°	′			″
Decl.	S	32	56·9	——	S	8·72

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	155·0	6·0	1836·87
Stone, O.	153·4	5·9	1877·53

A double star. A 7; B 7.

1089. 4 M. SCORPII. (H. 4183.) DLXIX.

R. A. 16h 16m 53s	Prec.	+ 3s·65
Decl. S 26° 14′·8	——	S 8″·72

A compressed mass of very small stars, in the middle of the creature's body, with outliers and a few small stellar companions in the field. From Antares it is only 1½° distant to the W. It is elongated vertically, and has the aspect of a large, pale, granulated nebula, running up to a blaze in the centre. It was discovered by Messier in 1764. In 1783 Sir W. Herschel resolved this object into stars; and gauging it by a modification of the method which he applied to fathom the Galaxy, he concluded that his 10ft reflector, having a power to show stars exceeding that of the eye 28·67 times, gave the profundity of this cluster of the 344th order. He describes it as having a ridge of eight or ten pretty bright stars, running from the middle to the *nf;* a description which I found to be very correct.

Under the head of 80 M. (No. 1080, *ante*), a slight allusion was made to nebulæ considered in their relations to the surrounding spaces. Like that singular mass, the group before us is also situated on the western edge of an area which contains no stars, *i. e.*, none which we can descry; and in such spaces invariably, according to the testimony of Sir W. Herschel, are nebulæ found, "Let us," says Arago, "connect these facts with the observation which has shown that the stars are greatly condensed towards the centre of spherical nebulæ, and with that which has afforded the proof that these stars sensibly obey a certain power of condensation (or clustering power), and we shall feel disposed to admit with Herschel, that nebulæ are sometimes formed by the incessant operation of a great number of ages, at the expense of the scattered stars (*étoiles dispersées*) which originally occupied the surrounding regions; and the existence of empty, or *ravaged* spaces, to use the picturesque expression of the great astronomer, will no longer present anything which ought to confound our imagination."

1090. γ HERCULIS. DLXX.

R. A. 16h 17m 4s	Prec.	+ 2s·64
Decl. N 19° 24′·7	——	S 8″·71

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	250·5	...	41·8	...	1780·68
HERSCHEL, J., and SOUTH	243·8	...	38·3	...	1821·85
SMYTH	242·3	...	38·7	...	1831·48

An open double star in a dark field, on the hero's left arm. A 3½, silvery white; B 10, lilac; and it points nearly upon a third star at a distance in the *sp* quadrant.

As the object is difficult under the micrometer, the discrepancies may be imputed to errors in the first observation.

γ Herculis may be readily seen in mid-distance of a line produced between α Ophiuchi and α Coronæ, passing also over α Herculis.

1091. 60 P. XVI. SCORPII. (*h. 4850.)

		h. / °	m. / ′	s.			s. / ″
R. A.		16	17	44	Prec.	+	3·74
Decl.	S	29	26·7		——	S	8·65

	Position. (°)	Distance. (″)	Epoch.
Herschel, J.	348·3	7·5	1835·98
Stone, O.	351·5	6·5	1877·50

A double star. A 6½; B 7½.

1092. 23 HERCULIS. DLXXIII.

		h. / °	m. / ′	s.			s. / ″
R. A.		16	18	43	Prec.	+	2·29
Decl.	N	32	35·4		——	S	8·58

	Position. (°)	Distance. (″)	Epoch.
Smyth	20·1	36·2	1830·72

A double star in a dark field, on the boundary between Hercules and the Northern Crown. A 6, white; B 9, violet; a star at a distance in the *sp*, and another nearly following.

[1½° S of ν Coronæ Borealis.]

1093. ρ OPHIUCHI. DLXXI.

		h. / °	m. / ′	s.			s. / ″
R. A.		16	18	59	Prec.	+	3·58
Decl.	S	23	11·5		——	S	8·55

		Position. (°)	Distance. (″)	Epoch.
Herschel, J., and South		2·5	4·0	1822·46
Herschel, J.	A B	1·9	4·1	1834·57
	A C	2·2	*not stated*	
	A D	286·6	*not stated*	
Main		358·4	3·1	1861·45
Stone, O.		357·4	3·7	1879·36

A fine neat double star, on the Serpent-bearer's foot which rests upon

Scorpio. A 5, pale topaz yellow; B 7½, blue; and they directly point upon No. 72 P. XVI., about 2½′ in the *nf.* There are two other companions in the field, the whole forming a pretty group, to the N. by W. of Antares, at 3° distance.

On the whole the angle might have undergone a slight change. In the Palermo Catalogue this star is erroneously designated 5 *g* Scorpii; and it has inadvertently had *g* applied to it instead of *ρ* in the *British Catalogue*, which letter was assigned to *ξ*, but Baily, finding that Bayer had mistaken *north* latitude for *south*, has respectively restored them.

1094. ε NORMÆ. (*h. 4853.)

	h.	m.	s.			s.
R. A.	**16**	**19**	**7**	Prec.	+	4·36
		°	′			″
Decl.	**S**	**47**	**18·6**	——	S	8·54

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	335·2	23·8	1836·32

A double star. A 5; B 7.

1095. 412 Dunlop NORMÆ. (h. 3627; H. 4187.)

	h.	m.	s.			s.
R. A.	**16**	**19**	**34**	Prec.	+	4·46
		°	′			″
Decl.	**S**	**48**	**53·8**	——	S	8·51

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; c L; p Ri; l C M; st 13...15;" which means:—"a cluster; considerably large; pretty rich; little compressed in the middle; the component stars vary from the 13th to the 15th magnitudes."

1096. 536 Dunlop NORMÆ. (h. 3628; H. 4189.)

	h.	m.	s.			s.
R. A.	**16**	**20**	**16**	Prec.	+	4·04
		°	′			″
Decl.	**S**	**38**	**35·2**	——	S	8·46

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; psb M; rr;" which means:—"bright; pretty large; round; pretty suddenly brighter in the middle."

1097. η DRACONIS. (O. Σ. 312.) DLXXVI.

	h.	m.	s.			s.
R. A.	16	22	30	Prec.	+	0·80
		°	′			″
Decl.	N	61	45·7	——	S	8·27

		Position.	Distance.	Epoch.
		°	″	
Struve, O.	A B	143·9	4·6	1843·71
Wilson and Seabroke	A B	142·5	4·9	1873·43
Burnham	A F	18·8	367·0	1879·36

A *Nautical Almanac* star, with a companion, in the middle of the Dragon's body. A 3, deep yellow; B 9; F 11, pale grey. O. Struve detected the minute *comes* to A, which is here designated B. [Burnham has found 3 very faint stars nearer than F, which he has designated C, D, E.] The Arabians designated η and ζ *Al-dhībaïn*, the two jackals, and the adjacent dim or *dark* pair, ω and *f*, *Adḥfár al-dhib*, the jackal's claws. They will be at once recognised from being between the head of the Dragon and the two bright stars of the Little Bear's fore-body, called the Guards. Though this object is in a barren field, the neighbourhood to the *sp* offers some brilliant groups of small stars; and directly N. of it is the fine double star of Σ.'s First Class "vicinæ," No. 2054 [= 99 B Draconis]. It is a capital telescope test.

1098. α SCORPII. DLXXIV.

	h.	m.	s.			s.
R. A.	16	22	39	Prec.	+	3·67
		°	′			″
Decl.	S	26	11·2	——	S	8·50

	Position.	Distance.	Epoch.
	°	″	
Mitchell	273·0	3·11	1848·59
Schiaparelli	273·9	3·22	1875·81
Stone, O.	271·1	3·02	1879·55

A *Nautical Almanac* star, with a companion discovered independently by J. W. Grant in 1844 and by O. M. Mitchell in 1846. A 1, fiery red; B 7, green or blue; A is followed by 2 telescopic stars.

["It is a grand telescopic object. Its tint, however, is not uniform: to me the disc appears yellow, with flashes of deep crimson alternating with a less proportion of fine green."—*Webb.*]

This star is the noted Antares, said to have been so called from 'Αντάρης, i.e. rivalling Mars in colour, a phrase first given in Ptolemy, and probably invented by very early astrologers: such is the generally received opinion, but Grotius shows, from an obscure note of Suidas, that Antares signifies a bat. "Utrum horum mavis accipe." It was named Καρδία Σκορπίου by the Greeks, *Cor Scorpionis* by the Latins, and *Kalb-al-'akrab*, also the Scorpion's heart, by the Arabians; which last is written *Calbalacrab* by the framers of the Alphonsine Tables. With α Virginis and α Boötis it forms a conspicuous triangle; and it may be picked up by running a long line from the Pole-star, by α Herculis down to where Antares will be seen, with four stars forming an arc over him, in the shape of a paper kite. Should clouds in the polar regions obstruct this, shoot a ray from α Leonis through α Virginis, and at 45° further to the eastward it will pass below Antares; also, a line from α Lyræ, carried by α Ophiuchi, and extended as far beyond, will reach it:

> Through Ras Alague, Wega's beams direct th' inquiring eye,
> Where Scorpio's heart, Antares, decks the southern summer sky.

Σκορπίος, Scorpio, or Scorpius, the reputed slayer of the giant Orion, is one of the ancient 48 asterisms, being the 8th sign in order in the zodiac, and the 2nd of the southern signs; and it is seen, says Sherburne, to crawl towards our meridian at midnight, about the end of May. Cicero and Manilius apply the Latin word Nepa to this asterism; and little as its size and figure correspond with the Megatherium so ably described by my friend Dr. Buckland, it was called Μέγα θηρίον by Aratus. Hood, in his use of the *Celestial Globe in plano*, says, "Novidius, writing of this constellation, is verie childish in his conceite, and for ought that I can see, doth falsifie the word of God; for he sayth, that this was the Scorpion or Serpent, whereby Pharaoh, king of Ægypt, was enforced to let the children of Israel depart out of his countrey, whereas there is no such thing in the Scripture."

Scorpio is not large, but so brilliant as to have attracted much notice from the corps of astrologers, with whom it was "the accursed constellation," and the baleful source of war and discord; for, besides its being accompanied by tempests when setting, it was of the watery triplicity, and the stinging symbol of autumnal diseases, as it winds along with its receding tail. But though stigmatised a *signum falsitatis* by seers of every degree, the redoubtable Gadbury, at whose birth it ascended, broke many a lance in its defence, and stoutly contended for its beneficial influences; and the alchymists were well assured, that the transmutation of iron into gold could only be performed when the sun was in that sign.

From some confusion of the Greeks, this constellation formerly occupied two signs of their zodiac; and the pulling back of the chelæ to make room for the scales, by the Romans, is mentioned under α Libræ. Astronomers have successively numbered their components, thus:

Ptolemy . . .	24 stars.	Hevelius	20 stars.
Tycho Brahé . .	10 ,,	Halley	29 ,,
Kepler	27 ,,	Flamsteed . . .	44 ,,
Bayer	29 ,,	Bode	200 ,,

1099. 88 P. XVI. OPHIUCHI. (Σ. 2048.) DLXXV.

R. A.	16h 22m 51s	Prec. + 3s·23
Decl.	S 7° 52′·8	—— S 8″·25

	Position.		Distance.		Epoch.
Struve, W.	302°·7	...	4″·68	...	1831·48
Stone, O.	300·6	...	5·0	...	1879·37

A very delicate double star, close upon the Serpent-bearer's right thigh; it is 25° distant from *α* Herculis, on a line S.S.W. towards *β* Scorpii, where it is also pointed out by a line through *δ* and *ε*, the two stars of the 3rd magnitude in the hand of Ophiuchus. A [7], yellow; B [9], dusky; other stars in the field, particularly one of a deep orange tinge in the *np*. Nor ought I to omit mentioning that 6 Hevelii, or *υ*, precedes it to the S. by about a minute of time, since it is of the 5th magnitude, and forms a sort of pointer to the delicate pair, on an angle of 133°.

1100. 2049 Σ. CORONÆ BOREALIS.

R. A.	16h 23m 23s	Prec. + 2s·47
Decl.	N 26° 13′·7	—— S 8″·21

	Position.		Distance.		Epoch.
Struve, W.	215°·6	...	1″·04	...	1833·08
Struve, O.	217·6	...	1·06	...	1847·47
Secchi	213·2	...	1·10	...	1856·50
Doberck	208·5	...	0·95	...	1877·47

A double star. A 7, white; B 8, white.

1101. λ OPHIUCHI. (Σ. 2055.) DLXXVII.

R. A.	16h 25m 22s	Prec. + 3s·02
Decl.	N 2° 13′·6	—— S 8″·05

	Position.		Distance.		Epoch.
Struve, W.	331°·8	...	0″·84	...	1825·51
Smyth	351·2	...	1·0	...	1834·48
Dawes	358·3	...	1·07	...	1840·54
Mädler	12·9	...	1·05	...	1850·58
Struve, O.	18·6	...	1·35	...	1861·63
Dembowski	28·6	...	1·51	...	1870·45
Doberck	33·5	...	1·59	...	1878·47
Burnham	37·7	...	1·45	...	1880·46

A fine binary star, in the bend of the Serpent-bearer's right arm.

A 4, yellowish white; B 6, smalt blue. This physical object is truly, as its discoverer said, very beautiful and close, for the measures are attended with great difficulty except when, as H. expresses it, "the star will be quiet."

This star has a great progressive angular motion. From the shown course and velocity, it is evidently making an elliptical and rapid orbit, of which the *annus magnus* may be between 80 and 90^{y}. [Mädler found the period to be 88^{y}, and Hind made it 95^{y}; but Doberck has arrived at a much higher value, namely 233^{y}, and there can be no doubt that this is much nearer the mark.]

The Arabians designated λ Ophiuchi *Marfik*, meaning the elbow; and it may be found S.W. of its own α, distant about 18°, rather more than half-way towards μ Serpentis.

1102. 400 Dunlop NORMÆ. (h. 3635; H. 4209.)

	h.	m.	s.			s.
R. A.	16	26	6	Prec.	+	4·50
		°	′			″
Decl.	S	49	31·8	——	S	7·99

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; l C; i F;" which means:—"a cluster; large; little compressed; of irregular figure."

1103. 40 ♅. VI. OPHIUCHI. DLXXIX.

(h. 3637; H. 4211; R.)

	h.	m.	s.			s.
R. A.	16	26	22	Prec.	+	3·34
		°	′			″
Decl.	S	12	47·8	——	S	7·97

A large but pale *granulated* cluster of small stars, on the Serpent-bearer's right leg. There are five telescopic stars around it, so placed as to form a crucifix when the cluster is high in the field; but the region immediately beyond is a comparative desert. After long gazing, this object becomes more compressed in the centre, and perplexes the mind by so wonderful an aggregation. It was registered as 5′ or 6′ in diameter by ♅. It is distant 3° from ζ Ophiuchi to the S.S.W., in the line between β Scorpii and β Ophiuchi.

1104. 3638 h. ARÆ. (H. 4216.)

	h.	m.	s.			s.
R. A.	16	27	45	Prec.	+	4·31
Decl.	S	45°	23′·3	—	S	7″·86

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; S; st p L;" which means:—"a cluster; bright; small; the stars are pretty large."

1105. 5770 Brisb. NORMÆ. (*h. 4866.)

	h.	m.	s.			s.
R. A.	16	30	34	Prec.	+	4·92
Decl.	S	56°	46′·4	—	S	7″·63

	Position.		Distance.		Epoch.
HERSCHEL, J.	125°·8	...	3″·9	...	1836·42

A double star. A 7½; B 8½.

1106. 3640 h. ARÆ. (H. 4223.)

	h.	m.	s.			s.
R. A.	16	31	28	Prec.	+	4·48
Decl.	S	48°	47′·6	—	S	7″·55

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; F; v L; vi E; B * inv;" which means:—"a remarkable object; faint; very large; very irregularly extended; there is a bright star involved in the nebula."

1107. 483 Dunlop ARÆ. (h. 3641; H. 4224.)

	h.	m.	s.			s.
R. A.	16	32	36	Prec.	+	4·23
Decl.	S	43°	9′·1	—	S	7″·47

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; c L; p Ri; i R; st 11 ... 14;" which means:—"a cluster; considerably large; pretty rich; irregularly round; the component stars vary from the 11th to the 14th magnitudes." Engraved, *Cape Obs.*, Pl. v. Fig. 4.

1108. 6912 Lac. ARÆ. (*h. 4876.)

		h.	m.	s.			s.
R. A.		16	33	5	Prec.	+	4·45
Decl.	S	48°	32′·9		——	S	7″·42

		Position.	Distance.	Epoch.
		°	″	
Herschel, J.	A B	265·1	9·8	1837·08
	A C	164·9	12 *est.*	
	A D	14·3	15 *est.*	

A difficult quadruple star. A 6½; B 7; C 13; D 14.

1109. 413 Dunlop ARÆ. (h. 3642; H. 4225.)

		h.	m.	s.			s.
R. A.		16	33	6	Prec.	+	4·47
Decl.	S	48°	32′·8		——	S	7″·42

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; l R i; l C; rrr; F neb inv;" which means:—"a cluster; very large; not very rich; little compressed; well resolved—clearly seen to consist of stars; there is a faint nebula involved in the cluster."

1110. 17 DRACONIS. (Σ. 2078.) DLXXXI.

		h.	m.	s.			s.
R. A.		16	33	37	Prec.	+	1·41
Decl.	N	53°	8′·8		——	S	7″·38

		Position.	Distance.	Epoch.
		°	″	
Struve, W.	A B	116·5	3·74	1831·91
Smyth	A B	115·7	3·8	1832·87
	A C	194·6	90·5	
Main	A C	14·2	90·0	1865·76
Dunér	A B	115·0	3·5	1871·04
Jedrzejewicz	A B	114·2	3·7	1876·81
	A C	14·2	90·7	1877·53

A triple star, preceding the Dragon's jaws, where a line from γ Draconis carried over β, and prolonged twice their distance, reaches it. A 6, pale yellow; B 6½, faint lilac; C 6, white; four other small stars in view. This object is 4 H. I., where A is designated 16 Draconis, which is the Flamsteed number of C; but there was no small confusion respecting them in the *British Catalogue*, as may be seen in the Notes 2301 and 2302 of Baily's edition.

The close star has been repeatedly measured, and the great coincidence of all the results sufficiently stamps its fixity.

1111. 136 P. XVI. HERCULIS. (Σ. 2071.) DLXXX.

	h.	m.	s.				s.
R. A.	16	33	44	Prec.	+		2·76
		°	′				″
Decl.	N	13	54·7	——		S	7·46

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	311·6	...	25·1	...	1830·14
Stone, O.	310·5	...	25·3	...	1879·35

A delicate double star in a barren field, in the space between the left arm and the head of Hercules; and 9° distant from the latter, on the western parallel. A [8½], pale yellow; B [9], bluish.

[Smyth's R.A. corrected by Sir J. Herschel.]

1112. 36 and 37 HERCULIS. (Σ. 31 App. I.) DLXXXII.

	h.	m.	s.				s.
R. A.	16	35	7	Prec.	+		2·97
		°	′				″
Decl.	N	4	26·1	——		S	7·25

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	233·0	...	67·7	...	1782·38
Smyth	229·9	...	69·2	...	1835·48
Bellamy	229·8	...	70·5	...	1875·48
Jedrzejewicz	229·7	...	69·8	...	1877·03

A pair of stars in a barren field, which, though pertaining to Hercules, are placed upon the right arm of Serpentarius, due W. of his β, and 16° distant from it. A 6½, pale blue; B 7½, blue; and just preceding B there is a minute *comes*, incapable of bearing the smallest illumination.

1113. 42 HERCULIS. (Σ. 2082.) DLXXXIII.

	h.	m.	s.				s.
R. A.	16	35	46	Prec.	+		1·63
		°	′				″
Decl.	N	49	8·6	——		S	7·20

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	93·7	...	21·5	...	1782·61
Struve, W.	92·3	...	22·3	...	1828·43

A very delicate triple star between the left knee of Hercules and Draco's head, of which only two are here measured. A 6, orange;

B 12, blue; the third star, which is still more minute, makes a neat triangle of the object, in a rich field; and it may be found to the W.S.W. of β Draconis, at $6\frac{1}{2}°$ distance: the small components are caught by averting the eye to other parts of the field of view. These are preceded by a 7th magnitude star on an angle of 211° and 4′ 20″ distant. A comparison of the measures indicates fixity.

1114. ζ HERCULIS. (Σ. 2084.) DLXXXIV.

	h. m. s.		s.
R. A.	16 37 8	Prec. +	2·26
	° ′		″
Decl.	N 31 48·2	—— S	7·26

	Position.		Distance.		Epoch.
	°		″		
STRUVE, O.	157·1	...	1·24	...	1840·66
STRUVE, O.	93·8	...	1·52	...	1850·53
STRUVE, O.	32·5	...	1·38	...	1860·74
DEMBOWSKI	190·8	...	1·09	...	1870·49
DOBERCK	124·9	...	1·28	...	1878·61
BURNHAM	114·3	...	1·38	...	1880·47

A close binary star, over the left hip of Hercules, where with ϵ, its companion in magnitude, it is rather conspicuous between Wega and Gemma. A 3, yellowish white; B 6, orange tint; a third star of the 9th magnitude in the *nf* quadrant, with Δ R.A. $23{\cdot}6^s$.

The duplicity of ζ Herculis was first detected under the eagle gaze of Sir W. Herschel, in July, 1782. In October, 1795, he again beheld the *comes*, but it afterwards disappeared, or, under the most delicate treatment, was only wedged; and the able astronomer remarked, "My observations of this star furnish us with a phenomenon which is new in astronomy; it is the occultation of one star by another. This epoch, whatever be the cause of it, will be equally remarkable, whether owing to solar parallax, proper motion, or motion in an orbit whose plane is nearly coincident with the visual ray." (*Phil. Trans.*, 1803, p. 378.)

In this state it remained unobserved for some years; and during 1821 baffled all the endeavours of H. and S. to divide, or even elongate. At length Σ. caught it double in 1826, though it again became single in two years, and remained so to the Dorpat instrument till 1832, when that persevering observer again measured it. It has since become comparatively of easy vision.

On the erection of the large telescope at Bedford, this was one of the first objects of my attention; but from Struve's description—"Magnitudinis constanter notari (3) et (7), colorem majoris album subflavum, minoris subrubrum. Difficultas in stella hac duplici videnda ex splendore oritur majoris,"—I did not expect to notch it. Following H.'s method, I first got my eye and instrument into order by scrutinizing η Coronæ; and then turning upon ζ Herculis, felt confident that I saw, and that readily, a red spot on its disc, which, from the above-quoted words, I took for the *comes*. It may, however, have been a spurious image or colour; for on the following apparition of Hercules, in 1831, wishing to show the same phenomenon to Captain Kater and Mr. Maclear, I could no longer receive the same impression. All attempts to notch it failed till the summer of 1838, when, though still deserving of Σ.'s epithet "vicinissimæ," the distance had palpably increased, and the stars were occasionally fairly divorced. As the question was of deep interest, unusual pains were taken with the measures, although, from the difficulty of observation, they could not be stamped with high weights. Indeed, all the evils of a double-wire micrometer had to be encountered.

This wonderful object ought to be narrowly looked after by all the new giant telescopes, since it offers, according to Struve's conclusions, the astounding velocity of an apparent and very elliptical orbit revolving in little more than 14 years! What a motion! Bacon little knew the force of his own expression, when he exclaimed, "Heavenly bodies have much veneration, but no rest." My own views, however, do not quite square with this velocity, although they acknowledge one about as astonishing: a scrutiny of the observations leads me to suppose an orbit with an excentricity of 0·4186, and a period of about 35 years.

[Various computers have investigated the orbit of this star; the following are some of the results:—Mädler, 31·4^{y}; Dunér, 34·2^{y}; Villarceau, 36·3^{y}.]

1115. 13 M. HERCULIS. DLXXXV.

(h. 1968; H. 4230; 𝕽.)

	h. m. s.		s.
R. A.	16 37 45	Prec. +	2·14
Decl.	N 36° 39′·9	—— S	7″·04

A large cluster, or rather ball of stars, on the left buttock of Hercules, between ζ and η; from η Herculis it lies S., a little westerly, and 3½° distant. This superb object blazes up in the centre, and has numerous outliers around its attenuated disc. [Secchi found a field 8′ in diameter filled with stars.] This object was accidentally hit upon by Halley, who says, "This is but a little patch, but it shows itself to the naked eye, when the sky is serene, and the moon absent." The same paper, in describing this as the sixth and last of the nebulæ known in 1716, wisely admits that "there are undoubtedly more of these which have not yet come to our knowledge:" ere half a century had passed, Messier contributed his 80 or 90 in the Catalogue of 103; and before the close of that century H. alone had added to the above 6, no fewer than 2500; and his son, in re-examining these, added 520 more! In my refractor its appearance was something like the annexed diagram; but I agree with Dr. Nichol, that no *plate* can give a fitting representation of this magnificent cluster. It is indeed truly glorious, and enlarges on the eye by studious gazing. "Perhaps," adds the Doctor, "no one ever saw it for the first time through a telescope without uttering a shout of wonder."

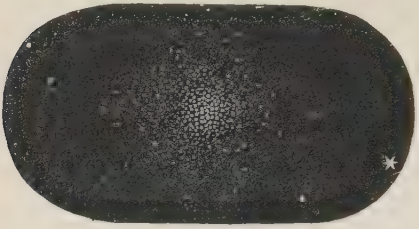

FIG. 34. 13 M. HERCULIS.

This brilliant cluster was discovered by Halley in 1714; and 50 years afterwards it was examined by Messier, with his 4^{ft} Newtonian, under a power of 60, and described as round, beautiful, and brilliant; but, "ferret" as he was in these matters, he adds, "Je me suis assuré qu'elle ne contient aucune étoile." This is rather startling, since the slightest optical aid enables the eye to resolve it into an extensive and magnificent mass of stars, with the most compressed part densely compacted and wedged together under unknown laws of aggregation. In 1787, Sir W. Herschel pronounced it "a most beautiful cluster of stars, exceedingly compressed in the middle, and very rich." In the Earl of Rosse's telescope the components were more distinctly separated, and brighter, than had been anticipated; and there were singular fringed appendages to the globular figure, branching out into the surrounding space, so as to form distinct marks among the general outliers.

[Engraved, *Phil. Trans.*, 1833, Pl. viii. Fig. 86; *Phil. Trans.*, 1861, Pl. xxviii. Fig. 33.]

1116. **442 Dunlop ARÆ.** (h. 3644; H. 4229.)

	h.	m.	s.			s.
R. A.	**16**	**38**	**18**	Prec.	+	4·40
	°	′				″
Decl.	**S** **46**	**49·1**		——	S	7·00

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p Ri; ei C M; st 11 ... 12;" which means:—"a cluster; pretty rich; extremely irregularly condensed in the middle; the component stars are of the 11th and 12th magnitudes." Engraved, *Cape Obs.*, Pl. v. Fig. 6.

1117. η HERCULIS. (Σ. 2093, rej.) DLXXXVI.

	h.	m.	s.			s.
R. A.	16	39	7	Prec.	+	2·05
		°	′			″
Decl.	N	39	8·0	——	S	6·93

	Position.	Distance.	Epoch.
	°	″	
Burnham	261·6	113·4	1879·29

A bright star with a distant companion, on the left thigh of Hercules, and nearly in a line with the last two objects. A 3, pale yellow; B 10, dusky.

A was described in 1827 as a first-class "vicinissimæ," like ζ Herculis and ν Coronæ; and its components were registered of the 4th and 8th magnitudes. Many were the efforts I made at distinguishing a proximate *comes*, but without effect; and when Σ.'s measures arrived in 1837, finding it was styled "simplex," I relinquished the attack.

This star is sufficiently conspicuous to the N.E. of α Coronæ Borealis, at about 16° distance; and it is also 19° from α Lyræ, on its western parallel; it forms an equilateral triangle with its own ζ and π.

1118. Σ. 5 N. HERCULIS. DLXXXVII.

(h. 1970; H. 4234; 𝕽.)

	h.	m.	s.			s.
R. A.	16	39	51	Prec.	+	2·51
		°	′			″
Decl.	N	24	0·0	——	S	6·87

A small planetary nebula, between the hero's shoulders, which H. aptly compares to a star out of focus. There are four stars in the field, of which that in the *sf* quadrant is of the 6th magnitude and brightly reddish, affording a fair test of comparison with the pale blue nebula. As this curious object presents a visible disc of 8″ in diameter, at a distance probably equal to that of the star near it, the vastness of its dimensions is within the range of reasonable conjecture, however it may stagger the comprehension.

This nebula is situated at about one-third the distance on an E.S.E. line from α Coronæ Borealis to α Aquilæ, and is to the N.E. of γ and β, in the left arm of Hercules, at a distance similar to that between those two stars. [Rather more than 1° *sp* 51 Herculis, a 5th mag. star.]

[" Very bright; small; not sharply defined; exactly like a star out of focus, bearing power well."—*Webb.* " Colour, very deep blue, 1865."—*Brodie.* Gaseous spectrum.]

[Engraved, Lamont, *Nebelflecken*, 1837, Pl. i. Fig. 1.]

1119. 364 Dunlop ARÆ. (h. 3646; H. 4232.)

		h.	m.	s.		s.
R. A.		16	40	41	Prec. +	4·77
			°	′		″
Decl.	S		53	36·9	—— S	6·80

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; Ri; l C M; st 9...12;" which means:—"a cluster; large; rich; little compressed in the middle; the component stars vary from the 9th to the 12th magnitudes."

1120. 46 HERCULIS. (Σ. 2095.) DLXXXIX.

		h.	m.	s.		s.
R. A.		16	40	42	Prec. +	2·38
			°	′		″
Decl.	N		28	33·6	—— S	6·81

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	163·9	...	4·96	...	1830·57
SMYTH	163·8	...	5·1	...	1834·50
WILSON and SEABROKE	163·8	...	5·1	...	1873·47

A neat double star, on the hero's back, and 7° distant N. by E. from β. A 7½, pale white; B 10, sky blue. [The fixity of both stars seems established in spite of a supposition once entertained to the contrary.]

1121. 12 M. OPHIUCHI. (h. 1971; H. 4238.) DXC.

		h.	m.	s.		s.
R. A.		16	41	31	Prec. +	3·11
			°	′		″
Decl.	S		1	45·9	—— S	6·73

A fine rich globular cluster, between the right hip and the elbow of Ophiuchus, with a *cortège* of bright stars, and many minute straggling outliers. This resolveable mass is greatly condensed towards the centre, with several very bright spots: it was discovered by Messier in 1764, but, probably from the imperfection of his means, was registered as "a round nebula, unaccompanied by any star." It is 8¼° distant from ε Ophiuchi, on a N.W. by W. line, leading nearly upon β.

Sir W. Herschel resolved this object in 1783; and in the following year his 20^{ft} reflector made it "a brilliant cluster, 7′ or 8′ in diameter; the most compressed parts about 2′.

[Seen slightly spiral by Laurence Earl of Rosse.]

1122. 19 OPHIUCHI. (Σ. 2096.) DXCI.

		h.	m.	s.			s.
R. A.	**16**	**41**	**37**		Prec.	+	3·02
			°	′			″
Decl.	**N**	**2**	**15·9**		——	S	6·73

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	93·1	...	20·4	...	1783·19
Struve, W.	92·6	...	22·2	...	1832·14
Smyth	92·9	...	21·8	...	1834·36
Smyth	92·2	...	21·6	...	1857·54

A delicate double star, under the Serpent-bearer's right axilla, 15° distant from *a* Ophiuchi, on a S.W. line towards the following of the two bright stars in the hand; 19 being nearly in mid-distance. A 6½, pale white; B 10, livid. This is a difficult object, and, moreover, there appears to be no little confusion in some Catalogues as to the identity of the several members of the little group on this spot, of which 19 is the largest.

[Webb in 1850, and again in 1857, thought the magnitude of B underrated.]

1123. 2101 Σ. HERCULIS.

	h.	m.	s.			s.
R. A.	**16**	**41**	**49**	Prec.	+	2·16
		°	′			″
Decl.	**N**	**35**	**50·2**	——	S	6·71

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	60·1	...	4·3	...	1829·6
Stone, O.	57·5	...	4·2	...	1879·41

A double star. A 5½, yellowish white; B 9½.

1124. 456 (?) Dunlop ARÆ. (h. 3650; H. 4240.)

	h.	m.	s.			s.
R. A.	**16**	**42**	**50**	Prec.	+	4·31
		°	′			″
Decl.	**S**	**44**	**31·9**	——	S	6·62

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; v L; v Ri; lb M; st 12 ... 13;" which means:—"a cluster; very large; very rich; less bright in the middle; the component stars are of the 12th and 13th magnitudes."

1125. 3649 h. ARÆ. (H. 4239.)

R. A.	$16^{h}\ 43^{m}\ 15^{s}$	Prec. + $5^{s}{\cdot}17$
Decl.	S $59^{\circ}\ 1'{\cdot}4$	—— S $6''{\cdot}59$

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; p B; c L; R; glb M; rr;" which means:—"a globular cluster; pretty bright; considerably large; round; gradually less bright in the middle; partially resolved—some stars visible."

1126. 6999 Lac. SCORPII. (*h. 4889.)

R. A.	$16^{h}\ 43^{m}\ 34^{s}$	Prec. + $4^{s}{\cdot}02$
Decl.	S $37^{\circ}\ 19'{\cdot}2$	—— S $6''{\cdot}57$

	Position.	Distance.	Epoch.
HERSCHEL, J.	$5^{\circ}{\cdot}0$	$7''{\cdot}2$	1835·37

A double star. A 6; B 9. Precedes μ^1 Scorpii, a star of mag. 3, by 49^{s}, and is 32′ to the N. of it.

1127. 50 H. IV. HERCULIS. (H. 4244; R.) DXCII.

R. A.	$16^{h}\ 43^{m}\ 56^{s}$	Prec. + $1^{s}{\cdot}68$
Decl.	N $47^{\circ}\ 48'{\cdot}0$	—— S $6''{\cdot}54$

A fine planetary nebula, between the left heel and the right knee of Hercules; from τ Herculis it bears E. by N., 4° distant, and from γ Draconis W.S.W., about 10°. This object is large, round, and of a lucid pale-blue hue; but its definition and distinctness are encroached upon by the brilliance of the 6th magnitude stars near it; one of which precedes the nebula by 22^{s}, nearly on the parallel. It was offered as a "prize comet" to Maria Louisa of Lucca, in 1819; and the *dénouement* made by Baron De Zach led to the appointment of M. Pons as her Majesty's *astroscoper* in the new observatory at La Marlia, where he was to receive 100 dollars for every comet that might be discovered. But the establishment, though commenced under considerable pomp and circumstances, only lingered about four years, and was then formally abolished. This is one of the mortifying instances wherein the poverty of a Queen's treasury prevented her manifesting that reverence for science which she really felt.

[Decl. from H. as corrected by Dreyer: Smyth's is 2·2′ less.]

1128. 3651 h. ARÆ. (H. 4243.)

R. A.	16h. 43m. 57s.	Prec.	+ 4·17s.
Decl.	S 41° 2′·0	——	S 6″·54

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; e L; e Ri (in M way);" which means:—"a cluster; extremely large; extremely rich; in the Milky Way." In the *Cape Obs.* mentioned thus:—"a 5th mag. star in a great cluster, or an immensely rich Milky Way patch."

1129. 2104 Σ. HERCULIS.

R. A.	16h. 44m. 45s.	Prec.	+ 2·15s.
Decl.	N 36° 6′·5	——	S 6″·47

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	19·6	...	5·8	...	1829·3
DUNÉR	18·4	...	5·9	...	1869·45

A double star. A 6½, white; B 8½, ash-coloured.

1130. 2106 Σ. OPHIUCHI.

R. A.	16h. 45m. 52s.	Prec.	+ 2·85s.
Decl.	N 9° 35′·9	——	S 6″·37

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	339·0	...	1·08	...	1825·52
MÄDLER	335·9	...	0·80	...	1842·42
DEMBOWSKI	321·3	...	0·5	...	1863·53
GLEDHILL	310·5	...	0·5	...	1874·40
BURNHAM	323·7	...	0·64	...	1878·38

A double star. A 7, white; B 9, white. The angle and distance are both diminishing, but the observations are not as harmonious as could be wished. Burnham's angle may be erroneous.

1131. 499 Dunlop SCORPII. (h. 3652; H. 4245.)

	h. m. s.		s.
R. A.	16 46 19	Prec. +	4·19
	° ′		″
Decl.	S 41 37·0	—— S	6·34

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; c L; p Ri; st 10...13;" which means:—"a cluster; bright; considerably large; pretty rich; the component stars vary from the 10th to the 13th magnitudes."

1132. 167 B. HERCULIS. (Σ. 2107.)

	h. m. s.		s.
R. A.	16 47 29	Prec. +	2·37
	° ′		″
Decl.	N 28 50·7	—— S	6·24

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	148·6	1·12	1829·91
STRUVE, O.	164·3	1·08	1841·54
MÄDLER	174·7	0·88	1851·20
STRUVE, O.	175·3	1·02	1861·53
DEMBOWSKI	202·0	0·80	1871·59
DUNÉR	212·3	0·99	1875·61

A binary star. A 7, yellowish; B 8½, bluish. The angle is obviously increasing, but the measures of distance are very contradictory. Dembowski says that observations are rendered difficult by the sombre colour of B. Dunér remarks that to see this object well requires "conditions très favorables et un fort grossissement."

1133. 520 Dunlop SCORPII. (h. 3654; H. 4249.)

	h. m. s.		s.
R. A.	16 48 6	Prec. +	4·11
	° ′		″
Decl.	S 39 19·3	—— S	6·19

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; L; Ri; st 8...11;" which means:—"a cluster; bright; large; rich; the component stars vary from the 8th to the 11th magnitudes."

1134. 3656 h. ARÆ. (H. 4252.)

	h. m. s.		s.
R. A.	16 49 52	Prec. +	4·38
	° ′		″
Decl.	S 45 45·3	—— S	6·04

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; L; l Ri; l C; st 8 … 12;" which means:—"a cluster; large; not very rich; not very compressed; the component stars vary from the 8th to the 12th magnitudes."

1135. 236 P. XVI. SCORPII. DXCIII.

	h.	m.	s.		s.
R. A.	**16**	**50**	**35**	Prec. +	3·51
		°	′		″
Decl.	**S**	**19**	**21·8**	—— S	5·98

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	227·3	… 5·6 …	1823·44
MAIN	225·7	… 4·8 …	1862·43
STONE, O.	230·9	… 4·8 …	1879·01
BURNHAM	231·7	… 4·5 …	1880·48

A neat double star, over the Scorpion's back, but in an absurd demesnal *hook* between the legs of Ophiuchus; it is 10° distant from Antares, to the N.N.E., which line leads upon η Ophiuchi, at about 5° further. A $6\frac{1}{2}$, yellowish white; B 8, pale green,—another small star follows in the *sf* by about 9s, and there is a telescopic coarse pair on the N. vertical. This object was thus pointed out by Piazzi: "Duplex. Comes vix fere visibilis, proxime præcedit paulisper ad austrum."

1136. 10 M. OPHIUCHI. DXCV.

(h. 1972, 3659; H. 4256; 𝕽.)

	h.	m.	s.		s.
R. A.	**16**	**51**	**22**	Prec. +	3·15
		°	′		″
Decl.	**S**	**3**	**56·8**	—— S	5·92

A rich globular cluster of compressed stars, on the Serpent-bearer's right hip. Of a lucid white tint, somewhat attenuated at the margin, and clustering to a blaze in the centre. It is so easily resolveable with very moderate means, that I am surprised at Messier's remark on registering it in 1764: "A beautiful round nebula. It may be seen, with attention, by a telescope 3ft in length." It follows ϵ Ophiuchi nearly on the E. parallel, at about 8° distance; being nearly midway between β Libræ and α Aquilæ, and about a degree preceding 30 Ophiuchi, a star of the 6th magnitude, with a smaller one preceding it. Sir W. Herschel resolved this object; and made it a beautiful cluster of extremely compressed stars, resembling Messier's 53. He estimated its profundity to be of the 243rd order.

["A fine cluster but inferior to 92 M. Herculis."—*Brodie.*]

1137. 456 Dunlop SCORPII. (h. 3660; H. 4260.)

R. A.	**16h 52m 47s**	Prec. +	4s·33
Decl.	**S 44° 29′·8**	—— S	5″·73

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"!; Cl; B; v L; v Ri; st 11;" which means:—"a remarkable object; a cluster; bright; very large; very rich; the component stars are chiefly of the 11th magnitude."

1138. 397 Birm. OPHIUCHI.

R. A.	**16h 53m 20s**	Prec. +	3s·36
Decl.	**S 12° 43′·5**	—— S	5″·75

Hind's "new star" which suddenly blazed forth in April 1848. It was first noticed on April 28, as being between the 4th and 5th magnitude. This brightness continued till about May 10. By May 18 it had fallen to the 6th magnitude. Petersen of Altona first saw it on April 30: according to him it had a magnitude of 5¼ on May 7, and was never brighter. He wrote of it:—"It has a very intense reddish-yellow light, and sometimes it appears to me that the red light becomes suddenly stronger, and as suddenly vanishes altogether." This star is still visible but is very small; say, mag. 11. It is probably variable to the extent of one whole magnitude.

1139. 62 M. SCORPII. (h. 3661; H. 4261.) DXCVI.

R. A.	**16h 54m 14s**	Prec. +	3s·80
Decl.	**S 29° 55′·4**	—— S	5″·69

A fine large resolveable nebula, at the root of the creature's tail, and in the preceding part of the Galaxy. It is an aggregated mass of small stars running up to a blaze in the centre. It is 5° from 26 Ophiuchi to the N. Messier described it as "a very pretty nebula, resembling a little comet, the centre bright, and surrounded by a faint light." Sir W. Herschel, who first resolved it, pronounced it a miniature of M. 3, and adds, "By the 20ft telescope, which at the time of these observations was of the Newtonian construction, the profundity of this cluster is of the 734th order."

[Engraved, *Cape Obs.*, Pl. vi. Fig. 13.]

1140. 3662 h. SCORPII. (H. 4263.)

	h.	m.	s.			s.
R. A.	16	54	30	Prec.	+	4·14
		°	′			″
Decl.	S	39	33·6	——	S	5·65

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; B; pL; cRi; st 10;" which means:—"a cluster; bright; pretty large; considerably rich; the component stars are chiefly of the 10th magnitude."

1141. 19 M. OPHIUCHI. (h. 1975, 3663; H. 4264.) DXCVII.

	h.	m.	s.			s.
R. A.	16	55	48	Prec.	+	3·69
		°	′			″
Decl.	S	26	6·9	——	S	5·55

A fine insulated globular cluster, of small and very compressed stars, between the Scorpion's back and the left foot of Ophiuchus; and nearly midway between two telescopic stars, in the preceding branch of the Via Lactea. It is of a creamy white tinge, and is slightly lustrous in the centre; but H. tells us, that even in the 20ft reflector it did not brighten to a blaze, or to a confusion of the stars with one another. It was discovered by M. in 1764, and described as a nebula without stars, of a round form, and seen well with a 3½ft telescope; but in 1784 Sir W. Herschel resolved it, and pronounced its profundity to be of the 344th order. It is 2¼° distant from 36 Ophiuchi, on a line W. by N., and 7½° due E. of Antares.

The above nebula, and the whole vicinity, affords a grand conception of the grandeur and richness even of the exterior creation; and indicate the beauteous gradation and variety of the heaven of heavens. Truly has it been said, "Stars teach as well as shine." This is near the large opening or hole, about 4° broad, in the Scorpion's body, which H. found to be almost destitute of stars.

1142. 20 DRACONIS. (Σ. 2118.) DXCIX.

	h.	m.	s.			s.
R. A.	16	55	52	Prec.	+	0·28
		°	′			″
Decl.	N	65	12·4	——	S	5·54

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	243·0 ...	0·50± ...	1781·70
Struve, W.	246·4 ...	0·84 ...	1832·30
Mädler	244·6 ...	0·65 ...	1847·97
Struve, O.	235·7 ...	0·58 ...	1859·67
Struve, O.	238·0 ...	0·27 ...	1872·42
Burnham	213·7 ...	0·20 ...	1880·06

A close double star, in the middle of the creature's body; it is nearly in mid-distance between β Ursæ Minoris and γ Draconis, where it precedes the bright star ζ. A 7, and B 7½, both white. This is a very difficult object. Nothing exhibits the comparative ease of observing at present, with the labour and exposure undergone by the zealous discoverer, more than his directions for this star. After stating that it is one of the most minute of all the double stars he had found, and too small for any micrometer in his possession, Ħ. adds, "It is in vain to look for them if every circumstance is not favourable. The observer as well as the instrument must have been long enough out in the open air to acquire the same temperature. In very cold weather, an hour at least will be required; but in a moderate temperature, half an hour will be sufficient."

Sir W. Herschel says the components of this object were "considerably unequal," whereas they are now so nearly of the same magnitude, that it was only after much comparison that I felt inclined to place the *comes* in the *sp* quadrant. Can it be variable?

The observations of this refractory star still leave us in doubt as to its being in motion or at rest—a physical or an optical object. "Aut itaque nil in his stellis mutatum est inde ex 1781, aut motus perficitur in plano valde ut videtur inclinato, et in 55 annis tota revolutio est absoluta," concludes Σ. Indeed, it was seeing the apparent increase of angle in the Dorpat Catalogue which induced me to take extraordinary pains to confirm it, and form an epoch, previous to the dismantling of my observatory; but the angle proved smaller than that which I had obtained seven years before.

[The angle seems almost unchanged, but a decrease in the distance is certain. There is some confusion in the identity of this star. In Lord Lindsay's edition of Struve it is named as above, but Sir J. Herschel (in his General Catalogue) and Dunér mark 19 Draconis = Σ. 2118. The above place accords with that of the star called 20 Draconis in the B.A.C.]

1143. ϵ URSÆ MINORIS. DCIII.

R. A.	**16ʰ 57ᵐ 15ˢ**	Prec. −	6ˢ·36
Decl.	**N 82° 12′·8**	—— S	5″·42

	Position.	Distance.	Epoch.
Burnham	6°·4	78″·2	1879·36

A *Nautical Almanac* star, with a minute *comes*, at the root of the Lesser Bear's tail, where it is readily identified, being the third star from Polaris. A 4, bright yellow; B 12, pale blue; three other telescopic stars in attendance, the nearest of which is about 2′ distant. It is about half way on the line between the Pole-star and η Ursæ Minoris.

1144. 556 Dunlop SCORPII. (h. 3664; H. 4265.)

		h.	m.	s.		s.
R. A.		16	57	18	Prec. +	4·07
		°	′			″
Decl.	S	37	43·7		—— S	5·42

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; p Ri; l C; st 9 ... 11;" which means:—"a cluster; large; pretty rich; little condensed; the stars vary from the 9th to the 11th magnitudes."

1145. 270 P. XVI OPHIUCHI. (Σ. 2114.) DXCVIII.

		h.	m.	s.		s.
R. A.		16	57	41	Prec. +	2·87
		°	′			″
Decl.	N	8	36·7		—— S	5·39

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	135·7	...	1·34	...	1830·97
Smyth	137·0	...	1·5	...	1832·41
Mädler	142·8	...	1·28	...	1852·22
Doberck	153·3	...	1·10	...	1877·48

A close double star, on the Serpent-bearer's right shoulder; it is to the W.S.W, of α Ophiuchi, at 9° distance, and is the *sf* of three stars, viz. 270, κ, and ι. A 7, and B 8, both white. This was discovered by Σ., and entered among his "vicinæ."

[The angle is evidently changing, but the distance seems unaltered, though O. Struve thinks otherwise. On a line carried from ι through κ, as far again.]

1146. 11 ♅. VI. OPHIUCHI. (h. 1976, 3665; H. 4268.)

		h.	m.	s.		s.
R. A.		16	57	44	Prec. +	3·66
		°	′			″
Decl.	S	24	36·3		—— S	5·38

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; L; R; g C M; rrr; st 16;" which means:—"a globular cluster; bright; large; round; gradually condensed towards the middle; easily resolved—clearly seen to consist of stars."

1147. 195 H. II. OPHIUCHI. (h. 3666; H. 4269.)

		h.	m.	s.		s.
R. A.		16	58	31	Prec. +	3·61
		°	′			″
Decl.	S	22	32·8		—— S	5·32

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; c B; L; R; g p m C M; rrr; st 16;" which means:—"a globular cluster; considerably bright; large; round; gradually pretty much condensed towards the middle; easily resolveable—clearly seen to consist of stars."

1148. 210 B. HERCULIS. (Σ. 2120.)

		h.	m.	s.		s.
R. A.		17	0	24	Prec. +	2·38
		°	′			″
Decl.	N	28	14·5		—— S	5·19

	Position.		Distance.		Epoch.
	°		″		
Struve, O.	345·8	...	2·83	...	1841·12
Struve, O.	306·8	...	2·19	...	1851·97
Struve, O.	281·5	...	2·97	...	1861·63
Dembowski	262·5	...	3·75	...	1871·44
Flammarion	256·5	...	4·32	...	1877·64

A beautiful double star discovered by Sir W. Herschel. A 7, tawny; B 10, deep blue. Though this star is so evidently in motion it is not yet certain that there is any physical connection between A and B, or that the motion is otherwise than rectilinear. Dembowski suspects B to be variable.

1149. 124 B. OPHIUCHI. (Σ. 2122.)

		h.	m.	s.		s.
R. A.		17	1	10	Prec. +	3·10
		°	′			″
Decl.	S	1	30·2		—— S	5·10

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	280·4	...	20·1	...	1831·47
Burnham	279·6	...	20·3	...	1878·48

A double star. A 7, white; B 9. Doubtless only an optical double star.

1150. μ DRACONIS. (Σ. 2130.) DCII.

	h.	m.	s.		s.
R. A.	17	3	3	Prec. +	1·24
		°	′		″
Decl.	N	54	37·1	—— S	4·93

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	232·4	4·35	1781·73
Struve, W.	205·1	3·23	1832·22
Smyth	200·3	3·3	1839·53
Struve, O.	191·1	2·82	1851·74
Secchi	181·0	2·72	1865·99
Doberck	171·0	2·49	1877·64
Jedrzejewicz	168·6	2·68	1879·82

A very neat binary star, on the tip of the Dragon's tongue; it is to the N.W. of β, and 3½° distant from it. A 4 and B 4½, both white. This object has been considered a miniature of Castor, but the stars are too nearly equal to bear out the resemblance accurately.

A geometrical rough-cast yields a period of about 600^y for the orbital revolution.

[The decrease both in angle and distance is very distinct; but I am not acquainted with any fresh attempt to determine the orbit of this object.]

1151. 12 H. VI. OPHIUCHI. (h. 1977, 3667; H. 4270.)

	h.	m.	s.		s.
R. A.	17	3	20	Prec. +	3·72
		°	′		″
Decl.	S	26	25·7	—— S	4·91

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“⊕; vB; L; R; psbM; rrr; st 16; F neb f;” which means:—“a globular cluster; very bright; large; round; pretty suddenly brighter in the middle; well resolved—clearly seen to consist of stars; the stars are chiefly of the 16th magnitude; a faint nebula follows.” This faint nebula here mentioned (= h. 1978; H. 4271) follows at a distance of 6^s and ¾′ to the N.

1152. 147 H. I. OPHIUCHI. (h. 3670; H. 4275.)

	h.	m.	s.		s.
R. A.	17	7	34	Prec. +	3·80
		°	′		″
Decl.	S	29	19·6	—— S	4·54

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"⊕; B; cL; R; s, vglbM; rrr; st 16 . . . 17;" which means:—"a globular cluster; bright; considerably large; round; at first suddenly, then very gradually less bright towards the middle; well resolved—clearly seen to consist of stars which are chiefly of the 16th and 17th magnitudes."

1153. 36 OPHIUCHI. DCIV.

R. A.	17h 8m 34s	Prec. + 3s·71
Decl.	S 26° 25′·3	—— S 4″·46

	Position.		Distance.		Epoch.
	°		″		
SMYTH	A B 226·1	...	5·2	...	1831·57
	A C 289·9	...	193·8		
SMYTH	A B 216·6	...	4·9	...	1842·46
POWELL	A B 210·0	...	4·62	...	1861·06
TALMAGE	A B 210·6	...	5·00	...	1871·51
BURNHAM	A C 305·9	...	198·0	...	1879·94

A triple, or rather multiple star, of which our principal business is with A and B, since the above results prove B to be on a retrograde march.

As there is some confusion in assigning the stars about here to their proper asterisms, we may be particular. 36 Ophiuchi is on the margin of the gap made in Scorpio's precincts, in carrying down those of Ophiuchus; by which arrangement or mis-arrangement it is artificially divided from 30 Scorpii, with which, as will be presently shown, it has an occult affinity. Both are between the Serpent-bearer's left foot and the root of the Scorpion's tail; and No. 36 is 10° due E. of Antares. Of the individuals first measured, A is 4½, and ruddy; B 6½, pale yellow; and C 7½, greyish; the latter being double, with a most minute *comes* near the *sf* vertical, whose existence Sir J. Herschel first pointed out to me. It would appear that Piazzi did not see A divided, as his note, "Duplex. 15·5″ temporis alia 7·8 magnit. præcedit, 1′ ad boream," evidently alludes to A and C. The principal star is thought to be variable, though I have always seen it as now registered. [Dawes and Knott both put A and B nearly on an equality as regards magnitude.]

36 Ophiuchi is upwards of 12′ distant from 30 Scorpii, on an ∠=70°.

Bessel first pointed out that 36 Ophiuchi and 30 Scorpii have a common proper motion, in these words (*Fundamenta Astronomiæ*, 30 Scorpii): "Ex observationibus hæc proficiscitur differentia inter stellam hanc atque A Ophiuchi:

		[Diff. in R.A.		Diff. in Decl.]	
		′	″	′	″
Flamsteedii . . .	1690	+ 13	32·4	+ 2	56·0
Bradleii	1755		...	+ 3	2·7
Mayeri	1756	+ 13	13·1		
Piazzi	1800	+ 13	7·0	+ 3	4·2
[Smyth	1839	+ 13	10·6	+ 3	4·4
Greenwich . . .	1864	+ 13	7·0	+ 3	7·2]

unde perspicuum fit, huic stellæ et illi duplici stellæ communem esse gravem motum." The movements of these stars through space have pretty nearly the same values; so that 36 Ophiuchi, while in itself a singular revolving binary system, is accompanying another and a most distant object in an *annus magnus*, to contemplate the period of which makes imagination quail. This is a curious example of two stars transferred, by a progressive uniform motion common to both, in a curve so vast as to appear a straight line, towards some unknown region, or, as Baily expresses it, "journeying together through space, and leaving the neighbouring stars behind." In the present state of knowledge it is impossible to ascertain whether this is a real motion arising from gravitation, or an apparent one, owing to the actual progression of the solar system towards some pre-ordained point in the heavens, between which and us they lie: at all events, such a march indicates that these stars cannot be only optically, or accidentally, connected.

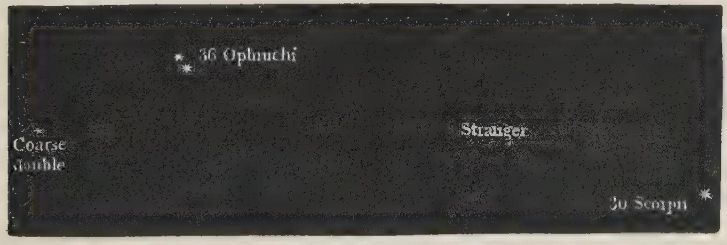

FIG. 35. 36 OPHIUCHI.

While making observations towards a future determination of this question, I perceived a star of the 14th magnitude, nearly between 36 Ophiuchi and 30 Scorpii, a little to the southward of a line joining them; and which, though in the range of the micrometer run, had escaped the gaze of preceding observers. This star being so placed as to become of interest, either as a point of departure or as partaking of the motions of its neighbours, is of greater importance than from its size it would otherwise be: it was therefore carefully diagrammed in 1835.

Wishing to know the action of the great Northumberland equatorial upon this group, I requested the Rev. J. Challis, in 1839, to give it a rigid scrutiny. This request was kindly complied with, and an arduous examination was rewarded with no fewer than four new stars; but they were most minute ones, as the largest *sp*, 36 Ophiuchi, is barely of the 16th magnitude. This was to be expected from an instrument of double the dimensions of mine, it having 11½in clear aperture and 19½ft focal length; whence the objective part is in greater proportion to the pupil of the eye than in my smaller one. Its field is therefore never without little specks of light; as was, from like causes, the case on looking into Sir J. Herschel's 20ft reflector at Slough,—I found it was never without company. Mr. Challis thus described the four additional stars: "*a* is a star nearly as easily seen as the small one of your coarse double, and is situated nearly at the point where lines passing through the two stars of 36 Ophiuchi and the two stars of your coarse double meet; *b* is about the same size; and *c* was seen with more difficulty, but very decidedly. *d* is the faintest star of all; it was as much as the telescope would do to make it visible, but I think I may be sure of its existence. I am greatly interested in giving you these particulars, as I am desirous of knowing what the light-transmitting power of the great Northumberland is, as compared with other telescopes."

1154. α HERCULIS. (Σ. 2140.) DCV.

	h. m. s.		s.
R. A.	17 9 38	Prec. +	2·73
Decl. N	14° 30′·9	—— S	4″·38

		Position.	Distance.	Epoch.
		°	″	
Herschel, W.	A B	117·2	5·0	1782·69
Smyth	A B	119·4	4·6	1832·51
Struve, O.	A B	116·8	4·7	1858·59
Doberck	A B	115·2	4·7	1876·54
Burnham	A C	38·7	85·4	1878·46
Jedrzejewicz	A B	115·9	4·7	1880·63

A *Nautical Almanac* star with a companion, on the head of Hercules. A 3½, orange; B 5½, emerald, or bluish green; and there are two distant stars of the 10th and 12th magnitudes in the *nf* quadrant, which are remarkable for their lilac tinge. [One of these is Burnham's C.] A was found to be variable by Ḫ., who compared it with κ Ophiuchi, changing from maximum 3 to minimum 4 in a period of 66 days. Σ. has since suggested that B also varies from 5 to 7.

This lovely object, one of the finest in the heavens, was described to be double by Piazzi, though not always easily seen so. "Duplex," ait, "comes sequitur ad austrum; et non semper nec facile distinguitur. Aptius ad id tempus Septemb. initium paulo post solis occasum." From the observations of its discoverer it was considered to have undergone an orbital increase of 11½° in little more than 23 years; therefore when Σ. attacked it in 1819, he expected to find the angle amount to about 130°. But the result was an actual retrogradation from H̥.'s determination, and as the Dorpat astronomer was convinced that he was within 1° of the truth, and indeed his last mean is drawn from five years' measures, it was concluded, either that the former observations were uncertain, or that one of the stars had *rebroussé chemin.* But all the subsequent measures, however they differ *inter se*, coincide in establishing the fixity of this object, thereby adding another instance to that of γ Andromedæ that highly-coloured stars are not necessarily in motion.

A discussion of the delicate observations of H̥. and Σ. led Baron De Zach to exhort those Uranian amateurs who wish to be useful, to work in the rich field of double stars: it is, he says, "un vaste et un très-fertile champ à défricher, que nous recommandons aux soins des amateurs qui voudront se rendre utiles, et faire encore autres choses que des observations banales qu'on répète partout."

The principal star is called Rasalgeti, from the Arabian *rás al-játhí*, the kneeler's head; and the casual gazer may pick it up by noting that α Aquilæ, α Lyræ, and α Ophiuchi form a triangle nearly equilateral, the latter being the preceding star, and having Rasalgeti about 5° before it; the heads both of Hercules and Serpentarius lie between Lyra and Scorpio. The galley rhymes afford another clue:

Amid yon glorious starry host,   that feeds both sight and mind,
Would you the Serpent-bearer's head,   and that of Herc'les find,
From Altair west direct a ray   to where Acturus glows,
One-third that distance, by the eye,   will both those heads disclose.

Rasalgeti is the *lucida* of Hercules, one of the old 48 asterisms, called Ἐν γόνασιν, Ingeniculus, Genuflexus, Saltator, and Incumbens Genubus, by the ancients; and represented as a man kneeling, weary, and sad. It was probably therefore not originally figured for the Theban; Eudoxus and Aratus, speaking by the well-known verses of Cicero, merely allude to his sorrow, and tell us:

Engonasin vocitant, genibus quod nixa feratur.

The early Venetian editions of Hyginus figure Hercules as going to attack a snake coiled round the trunk of an apple-tree; and Bayer depicted a mystic apple-branch in the Theban's hand. Hevelius transformed it into a bunch of snakes, under the name of Cerberus, from the watch-dog of the infernal portals; with the fox carrying a goose for his breakfast, as shown in the *Prodromus Astronomiæ.* Some have considered the emblem as typifying the serpent which infested the vicinity of Cape Tænarus, whence a sub-genus of Ophidians still derives its name.

This symbol of the "tricapitem canem infernalem voracem" figures among the new constellations which follow Hevelius, in his homage to

Urania and the great astronomers, in the elaborate frontispiece to his *Uranographia.* Bode has adopted both the apple-branch and the snakes, in his Atlas, under the style and title of *Cerberus et Ramus.*

This constellation is of great extent and importance, notwithstanding it boasts of no star larger than the 3rd magnitude: yet several of that and the 4th size decorate the head, back, shoulders, hips, thighs and right ankle of the figure. But though this asterism is not very remarkable to the eye, its double stars, nebulæ, and clusters render it telescopically interesting and glorious. The components have increased thus:

Ptolemy	30 stars.	Hevelius	45 stars.
Tycho Brahé . .	28 „	Flamsteed . . .	113 „
Clavius	31 „	Bode	451 „

Hevelius, in his *Prodromus Astronomiæ,* reported a nebula on the top of Hercules' head, close to Rasalgeti, which Messier searched for in vain. The nearest nebula to this star appears to be 901 H. II., but that being too small and faint for the power of the telescopes used in Hevelius's day, the object must have been a comet.

1155. 45 H I. OPHIUCHI. (h. 3671; H. 4279.)

		h.	m.	s.		s.
R.A.		17	9	42	Prec. +	3·76
			°	′		″
Decl.		S	28	0·7	—— S	4·37

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; cB; pS; R; gvmbM; rrr; st 16 . . . 17;" which means:—"a globular cluster; considerably bright; pretty small; round; gradually very much brighter in the middle; well resolved—clearly seen to consist of stars; which are chiefly of the 16th and 17th magnitudes."

1156. 522 Dunlop SCORPII. (h. 3672; H. 4280.)

		h.	m.	s.		s.
R.A.		17	10	8	Prec. +	4·14
			°	′		″
Decl.		S	39	19·3	—— S	4·33

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; pL; Ri; R; gbM; st 12 . . . 14;" which means:—"a cluster; pretty large; rich; round; gradually brighter in the middle; the stars are of the 12th to the 14th magnitudes."

1157. δ HERCULIS. (Σ. 3127.) DCVIII.

	h. m. s.		s.
R. A.	17 10 31	Prec. +	2·46
Decl.	N 24 58·3	—— S	4·38

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	162·5	...	33·7	...	1779·61
STRUVE, W.	173·7	...	26·1	...	1829·77
SMYTH	175·1	...	24·5	...	1839·62
STRUVE, O.	177·7	...	22·5	...	1849·73
DEMBOWSKI	178·6	...	21·1	...	1858·39
DEMBOWSKI	180·9	...	19·5	...	1869·54
FLAMMARION	181·6	...	18·4	...	1877·00
JEDRZEJEWICZ	182·9	...	18·1	...	1877·66

A star on the hero's right shoulder, and due N. of its *lucida* about 11°, forming a nearly equilateral triangle with it and β. A 4, greenish white; B 8½, grape red.

The results show a very appreciable decrease of distance, and a direct angular increase *sp nf;* the object therefore, as H. observes, merits particular attention, "as the change is contrary to what the presumed proper motion of the large star would alone produce."

[O. Struve is of opinion that there has been no deviation from uniform rectilinear motion. If the relative change is entirely due to difference of proper motion the minimum distance, 9·2″, will be attained about 1963. If, on the contrary, the stars form a binary star, the distance will continue to diminish for a shorter period.]

1158. 31 SCORPII. [= 38 OPHIUCHI.] DCVI.

	h. m. s.		s.
R. A.	17 10 49	Prec. +	3·71
Decl.	S 26 30·3	—— S	4·30

	Position.		Distance.		Epoch.
	°		″		
SOUTH	330·8	...	7·1	...	1825·53
SMYTH	330·4	...	6·8	...	1835·64
STONE, O.	334·0	...	5·1	...	1879·24

A delicate double star, between the left foot of Ophiuchus and Scorpio's back, and closely following 36 Ophiuchi, already treated of. A 6½, pale white; B [9], ash-coloured. This object has generally been registered as 38 Ophiuchi; but the two may be considered as identical, since Flamsteed's remark, that three or four telescopic stars follow it, shows that it is 31 Scorpii of the *British Catalogue*.

My observations go far to show its fixity as an optical object. It is, however, difficult to handle, from the variable refractions of so low an altitude and the smallness of the *comes.*

This object is about 10° to the N. of the *karazat,* or end lump in the Scorpion's tail, from which *al-shaúlah,* the sting, issues.

1159. 3673 h. SCORPII. (H. 4281.)

	h.	m.	s.		s.
R. A.	17	10	53	Prec. +	4·28
		°	′		″
Decl.	S	42	45·7	—— S	4·27

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"cl; v L; p Ri; l C (* nf taken);" which means:—"a cluster; very large; pretty rich; little compressed; (the place taken is that of a star in the *nf* quadrant)."

1160. 6016 Brisb. ARÆ. (*h. 4931.)

	h.	m.	s.		s.
R. A.	17	10	54	Prec. +	5·24
		°	′		″
Decl.	S	59	19·4	—— S	4·27

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	260·5	...	$\frac{3}{4}$ *est.*	...	1836·52

A double star. A 8; B 8. Sir J. Herschel states in a note that he thinks the above distance under-rated and that it was really not less than 1″, for the discs were "excellently separated."

1161. 39 OPHIUCHI. DCVII.

	h.	m.	s.		s.
R. A.	17	11	18	Prec. +	3·65
		°	′		″
Decl.	S	24	9·9	—— S	4·23

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	357·2	...	10·0	...	1782·46
SMYTH	356·2	...	12·1	...	1838·52
MAIN	353·7	...	11·0	...	1862·45
STONE, O.	354·9	...	10·7	...	1879·33

A neat double star, on the toes of the Serpent-bearer's left foot, and 1° distant to the N.W. of the bright star θ. A $5\frac{1}{2}$, pale orange; B $7\frac{1}{2}$, blue. This is a very fine object, and was once measured in full twilight.

The subsequent measures of H., S. and myself are so coincident as to indicate the fixity of this optical object.

About the end of September, 1604, the scholars of Kepler discovered a very remarkable star near this. They were examining the planets Mars, Jupiter, and Saturn, which were then sufficiently close to each other in that quarter to engage the attention of astronomers, and Möstlin very quickly detected the interloper. At first it surpassed Jupiter in magnitude, and its brilliancy even rivalled that of Venus; but it afterwards became as small as Regulus, and as dull as Saturn. It was white near the horizon, but as it rose, it assumed alternately the varying colours of the rainbow; it had no parallax, and was exactly round. When in this state, it had the honour of being particularly observed by Galileo; and the lovers of salad will recollect Kepler's attack on the Epicureans, in his account of its advent. It gradually diminished in splendour till October, 1605, when it was very small, and about the beginning of 1606 it entirely disappeared, nor has it been seen since. Pigott searched in vain for it in 1782; but the vicinity should be constantly watched.

1162. 3675 h. ARÆ. (H. 4284.)

	h.	m.	s.			s.
R. A.	17	12	2	Prec.	+	4·72
		°	′			″
Decl.	S	51	37·6	——	S	4·17

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!!; ○; p B; v S; R;" which means:—"an exceedingly remarkable object; a planetary nebula; pretty bright; very small; round."

Engraved, *Cape Obs.*, Pl. vi. Fig. 6.

1163. 9 M. OPHIUCHI. (h. 1979, 3677; H. 4287; ℜ.) DCIX.

	h.	m.	s.			s.
R. A.	17	12	37	Prec.	+	3·50
		°	′			″
Decl.	S	18	24·2	——	S	4·12

A globular galaxy-cluster, on the Serpent-bearer's left leg, with a coarse telescopic double star in the *np* quadrant. This fine object is composed of a myriad of minute stars, clustering into a blaze in the centre, and wonderfully aggregated, with numerous outliers seen by glimpses. It was registered by Messier in 1764; and described by him as a nebula, "unaccompanied by any star." Sir W. Herschel resolved it with his 20^{ft} reflector, in 1784; and he estimated its profundity as, at least, of the 344th order. He thought it a miniature of 53 M.; and it is one of those which forms a capital object for proving the space-penetrating power of a telescope. It lies 3° to the S.E. of η, and rather more than a quarter of the way from α Scorpii to α Aquilæ.

1164. 68 HERCULIS. (O. Σ. 328.)

		h.	m.	s.			s.
R. A.		17	13	16	Prec.	+	2·2
		°	′				″
Decl.	N	33	13·1		——	S	4·13

	Position.	Distance.	Epoch.
	°	″	
Struve, O.	61·8 ...	4·3 ...	1847·89
Dembowski	61·1 ...	4·2 ...	1867·38
Burnham	61·5 ...	4·0 ...	1878·40

"An exquisite double star." A 5, pale yellow; B 11, deep indigo. According to Schmidt, A is variable from 4 to 6 mag. in about 40 days.

1165. 92 M. HERCULIS. (H. 4294; ℜ.) DCXI.

		h.	m.	s.			s.
R. A.		17	13	46	Prec.	+	1·84
		°	′				″
Decl.	N	43	15·1		——	S	4·02

A globular cluster of minute stars, preceding the right leg of Hercules. This object is large, bright, and resolveable, with a very luminous centre; and, under the best vision, has irregular streamy edges. It is immediately preceded by a 12th magnitude star, distinct from the outliers, and there are several other stars in the field, of which the brightest is of the 7th magnitude in the *nf*, with a Δ R.A.=28s. Messier, who enrolled it in 1781, remarks that "it is easily seen with a telescope of one foot;" and it really demands very little optical aid to render it visible. Messier's own instrument did not, it seems, resolve it, for he compares the shining centre, with its attendants, to the nucleus of a comet surrounded by nebulous matter; but, of course, it rose into a brilliant cluster, of 7′ or 8′ in diameter, before the reflectors of Sir W. Herschel in 1783. From η Herculis it bears N. by E., 1½° distant; bearing to the N. of α Herculis, and W. of α Lyræ. ["Nucleus possibly spiral, darker spaces. Nucleus barely, if at all, resolved."—*Parsonstown Obs.*]

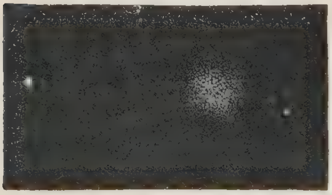

Fig. 36. 92 M. Herculis.

1166. ν SERPENTIS. DCX.

		h.	m.	s.			s.
R. A.		17	14	38	Prec.	+	3·36
		°	′				″
Decl.	S	12	44·0		——	S	3·94

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J., and SOUTH	30·7	...	50·2	...	1821·97
HALL	31·6	...	48·1	...	1863·60

A wide double star, in the middle of the Serpent; it lies 4° to the N.E. of η, and consequently in the line between α Scorpii and the Eagle's tail. A 4½, pale sea-green; B 9, lilac; and there is a third star, of a dusky tint, at a distance in the *np* quadrant.

1167. 3680 h. SCORPII. (H. 4290.)

R. A.	17h. 14m. 43s.		Prec. +	4s·11
Decl.	S 38° 22′·0		—— S	3″·93

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!!; ◎; e F; S; am St;" which means:—"an exceedingly remarkable object; an annular nebula; exceedingly faint; small; amongst stars."

Figured, *Cape Obs.*, Pl. vi. Fig. 3. In that work the following additional remarks occur:—"a beautiful delicate ring, of a faint ghost-like appearance, about 40″ in diameter; in a field of about 150 stars of the 11th and 12th magnitudes and under. *In* it is one star of the 12th mag. very conspicuous, and one of the 15th mag. much less so. Near it are 2 stars of the 14th and 15th mags., and S. of it at a distance of 60″ is another." Engraved, Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. vii. Fig. 30.]

1168. 48 ♅. I. OPHIUCHI. (h. 3683; H. 4296.)

R. A.	17h. 17m. 8s.		Prec. +	3s·49
Decl.	S 17° 42′·3		—— S	3″·73

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; c L; vgvmb M; rrr; st 20;" which means:—"a globular cluster; very bright; considerably large; very gradually very much brighter in the middle; well resolved—clearly seen to consist of stars; which are chiefly of the 20th magnitude," [in other words, which are *very* small].

1169. 73 P. XVII. ARÆ. (*h. 4949.)

R. A.	17h. 18m. 45s.		Prec. +	4s·41
Decl.	S 45° 44′·6		—— S	3″·59

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	267·4	...	3·2	...	1836·56

A double star. A 6½; B 7½.

1170. 94 P. XVII. OPHIUCHI. (Σ. 2160.) DCXII.

	h.	m.	s.		s.
R.A.	17	19	36	Prec. +	2·70
	°	′			″
Decl. N	15	42·4		—— S	3·52

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	61·9	4·0	1830·23
Smyth	65·0	5	1835·52
Wilson and Seabroke	65·6	4·0	1873·50

A very delicate double star, between the heads of Ophiuchus and Hercules; it is 2° N.E. of α Herculi, on the line towards β Cygni. A 7, brilliant white; B [$10\frac{1}{2}$], violet tint: A is followed by a ruddy star of nearly the same magnitude at a Δ R.A.$=16\cdot5^{s}$, which, with another in the *nf*, forms a neat isosceles triangle. This severe test was discovered by Σ., and measurement being precluded by the minuteness of the *comes*, the results are from a mean of several estimations made near the meridian, but amid occasional glares of sheet lightning. On the arrival of the Dorpat Catalogue this was among the first objects I referred to, in order to see the degree of weight assignable to my estimations when placed in juxtaposition with actual and trusty measurements.

1171. ρ HERCULIS. (Σ. 2161.) DCXIII.

	h.	m.	s.		s.
R.A.	17	19	53	Prec. +	2·07
	°	′			″
Decl. N	37	14·9		—— S	3·49

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	307·4	3·60	1830·35
Smyth	308·9	3·7	1839·74
Mädler	311·1	3·62	1852·13
Doberck	311·2	3·87	1876·54
Jedrzejewicz	312·7	3·89	1878·45

A beautiful double, in the middle of the hero's right thigh, 2° to the eastward of π, on the line towards Wega. A 4, bluish white; B $5\frac{1}{2}$, pale emerald. This object was entered double by Piazzi: "Duplex, minor præcedit." [The observations may indicate fixity: or a very slow increase in angle may be in progress. "No trace of green visible in B, with $8\frac{1}{2}^{\text{in}}$ refractor, 1866."—*Brodie.*]

1172. 225 Dunlop PAVONIS. (h. 3684; H. 4300.)

		h.	m.	s.			s.
R. A.		17	20	28	Prec.	+	6·16
		°	′				″
Decl.	S	66	57·5		——	S	3·44

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864 :—"⊕; cB; L; vgmb M; rrr; st 14 . . . 17;" which means :—"a globular cluster; considerably bright; large; very gradually much brighter in the middle; well resolved—clearly seen to consist of stars; which range from the 14th to the 17th magnitudes."

1173. 11 H. IV. OPHIUCHI. (h. 1981, 3686; H. 4302; R.)

		h.	m.	s.			s.
R. A.		17	22	39	Prec.	+	3·65
		°	′				″
Decl.	S	23	39·4		——	S	3·25

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864 :—"!!; ◎; pB; S; R;" which means:—"a remarkable object; an annular nebula; pretty bright; small; round." Engraved, *Cape Obs.*, Pl. vi. Fig. 4.

1174. 2166 Σ. OPHIUCHI.

		h.	m.	s.			s.
R. A.		17	22	44	Prec.	+	2·80
		°	′				″
Decl.	N	11	28·6		——	S	3·34

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	283·1	...	27·4	...	1831·36
MAIN	279·7	...	27·2	...	1864·76
JEDRZEJEWICZ	282·5	...	27·2	...	1876·96

A double star. A 6, white; B 8, bluish.

1175. 147 P. XVII. DRACONIS. (Σ. 2180.) DCXV.

		h.	m.	s.			s.
R. A.		17	26	19	Prec.	+	1·44
		°	′				″
Decl.	N	50	57·5		——	S	2·93

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	267·6	...	3·5 ±	...	1782·84
SMYTH	266·2	...	3·2	...	1836·53
DUNÉR	265·3	...	2·9	...	1872·22

A fine double star, between the right foot of Hercules and the

Dragon's eye; it is about 1½° S. of β Draconis. A 8, pale white; B 8½, ruddy. This pretty object, though bearing a physical aspect, seems to have undergone no alteration since its discovery.

1176. β DRACONIS. DCXVI.

	h. m. s.		s.
R. A.	17 27 57	Prec. +	1·35
Decl.	N 52° 22′·9	—— S	2″·79

	Position.	Difference of R.A.	Epoch.
SMYTH	100°·6 ...	29s·8 ...	1834·59

A *Nautical Almanac* star, with a very distant companion, in the Dragon's eye. A 2, yellow; B 10, bluish; with a coarse telescopic double star *nf* of B, by about 30^{s}, and several other stars in the field.

This object is the Alwaid of the Catalogues, from the Arabian *al-'awáyid*, the suckling camels. β has displaced α both as a *Nautical Almanac* standard, and a *lucida*. It is now generally rated of the 2nd magnitude, whereas Ptolemy marked it γ in brightness; and Ulugh Beigh, Tycho Brahé, Hevelius, Bradley, Zach, and Mayer followed him in stamping it of the 3rd size. Flamsteed, however, made it 2½, and Piazzi raised it to 2. A future day may restore the rights of α, for they may both be variable at long periods. β and γ Draconis, in the head of Draco, may be readily known from being nearly in the curved line joining it to α Cygni and α Boötis; and with two stars, μ and ξ, just to the N. of them, they form an irregular trapezium.

From Alkaid on the Great Bear's tail, to Cygnus cast your eye;
Midway between the Bird and Beast the Dragon's head you'll spy.

1177. 457 Dunlop SCORPII. (h. 3690; H. 4307.)

	h. m. s.		s.
R. A.	17 28 14	Prec. +	4·38
Decl.	S 44° 39′·9	—— S	2″·77

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; L; R; pg, psvmb M; rrr, st 17;" which means:—"a globular cluster; very bright; large; round; at first pretty gradually, then pretty suddenly very much brighter in the middle; well resolved—clearly seen to consist of stars, which are chiefly of the 17th magnitude."

1178. 54 OPHIUCHI. (Σ. 2184.) DCXVII.

	h.	m.	s.			s.
R. A.	17	29	19	Prec.	+	2·76
		°	′			″
Decl.	N	13	14·3	——	S	2·68

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	76·7	21·4	1830·19
SMYTH	75·0	20·0	1833·56

A most delicate double star, on the crown of the Serpent-bearer's head, and closely due N. of the *lucida*. A 6, pale straw-colour; B 14, blue; several other stars in the field. In the original register it is merely described as excessively unequal, and about 8″ apart. Now, with all my gazing, as I could only see the glimpse point of light noted B, which I could not estimate at less than 20″, I concluded that there was a still smaller companion beyond my reach. On the arrival, however, of the Dorpat Catalogue, I found that Struve had measured my *comes*, and had seen no other with his then unequalled refractor; so that I cannot but think H. had written 18″ on his original entry.

1179. 53 OPHIUCHI. (Σ. 34 App. I.) DCXVIII.

	h.	m.	s.			s.
R. A.	17	29	23	Prec.	+	2·84
		°	′			″
Decl.	N	9	39·8	——	S	2·67

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	191·3	41·6	1821·4
SMYTH	192·5	41·3	1836·51
BELLAMY	191·2	41·7	1875·69
JEDRZEJEWICZ	191·6	41·2	1877·04

A wide double star, closely following the Serpent-bearer's neck, and 3° S. of *α* Ophiuchi. A 6, and B 8, both bluish. This object is followed by two 8th magnitude stars.

1180. *α* OPHIUCHI. DCXIX.

	h.	m.	s.			s.
R. A.	17	29	50	Prec.	+	2·77
		°	′			″
Decl.	N	12	38·4	——	S	2·83

	Position.	Difference of R. A.	Epoch.
	°	s.	
SMYTH	187·2	1·4	1833·54

A *Nautical Almanac* star, with a minute companion, at the back of the Serpent-bearer's head. A 2, sapphire; B 9, pale grey; and there is a coarse triplet of small stars preceding, nearly on the parallel. A is designated Rasalague, from the Arabian *rás-al-ḥawwá,* the serpent-charmer's head: but it was variously corrupted in astronomical writings. In observation it may be easily found, as it lies nearly in mid-distance of a line drawn from α Lyræ down to α Scorpii; and it is the preceding point of a nearly equilateral triangle, which it forms with α Lyræ and α Aquilæ. In starting from the last-named star, our galley-poet gives his sage advice, and thus it runs:

> From *Altair* let a ray be cast, where we Arcturus view,
> One-third that distance will reveal the star *Ras-al-hague.*

This star may have undergone a slight change of brilliance, since Ptolemy rated it γ, and he was followed by Ulugh Beigh and Tycho Brahé; but Hevelius, Flamsteed, Bradley, Mayer, Zach, and Piazzi are unanimous in designating it of the 2nd magnitude.

'Οφιοῦχος, Ophiuchus, is a large, though not a very conspicuous, constellation, most uncouthly figured as respects Hercules: it has no proper name, but is merely designated from holding a serpent. Yet he is not without appellations enough, being the Anguitenens of Cicero, the Anguifer of Columella, and the Serpentarius of the Tables: and he also appears as Serpentis lator, Effæminatus, and even as Cacus, the bad man. Whatever may have been the original intention in placing this figure in the heavens, it is one of the old 48 asterisms, and its constituents have been thus numbered:

Ptolemy . . .	29 stars.	Hevelius	44 stars.
Ulugh Beigh .	29 ,,	Flamsteed . . .	74 ,,
Tycho Brahé . .	37 ,,	Bode	289 ,,

In 1604 the scholars of Kepler discovered a new star in the eastern foot of Ophiuchus, which appeared brighter than one of the 1st magnitude; but in a few months it again became invisible. Such reports call for attention to the prospect of a re-appearance.

1181. ν^1 DRACONIS. (Σ. 35 App. I.) DCXX.

	h.	m.	s.		s.
R. A.	17	30	0	Prec. +	1·16
	°	′			″
Decl.	N 55	15·5		—— S	2·62

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	313·2 ...	61·7 ...	1833·85
Jedrzejewicz	312·7 ...	61·8 ...	1877·60

A wide pair of stars, in Draco's mouth; 3° to the N. of β, on a line towards Polaris. A and B, both 5, and both pale grey. [Yarnall makes the *p* star slightly the brighter of the two.]

The values of the proper motions, though slight, are important, for having similar signs, they indicate a physical connexion of the two stars. The verification of this point requires another epoch of exact observation.

To find this star by alignment, run an occult ray from γ to η, and it will pass over the two ν's at about one-third the distance.

1182. 163 P. XVII. HERCULIS. (Σ. 2190.)

	h. m. s.		s.
R. A.	17 31 14	Prec. +	2·2
Decl.	N 21° 4′·0	—— S	2″·54

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	33·2	...	10·1	...	1829·66
Mädler	33·6	...	10·1	...	1843·74
Dembowski	23·0	...	10·2	...	1863·39
Wilson and Seabroke	24·9	...	10·6	...	1876·53
Burnham	23·9	...	10·1	...	1878·5

A double star. A 6, yellow; B 9½, lilac. Burnham suggests an error of 10° in the angles given by Struve and Madler, as the angle has of late years remained unchanged.

1183. 366 Dunlop ARÆ. (h. 3692; H. 4311.)

	h. m. s.		s.
R. A.	17 31 43	Prec. +	4·87
Decl.	S 53° 36′·3	—— S	2″·47

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; v L; Ri; st 13;" which means:—"a globular cluster; bright; very large; rich; the stars are chiefly of the 13th magnitude."

1184. 14 M. OPHIUCHI. (h. 1983, 3698; H. 4315; Ʀ.) DCXXI.

	h. m. s.		s.
R. A.	17 31 50	Prec. +	3·14
Decl.	S 3° 11′·2	—— S	2″·46

A large globular cluster of compressed minute stars, on the Serpent-bearer's left arm. This fine object is of a lucid white colour, and very nebulous in aspect; which may be partly owing to its being situated in a splendid field of stars, the lustre of which interferes with it. By diminishing the field under high powers, some of the brightest of these attendants are excluded, but the cluster loses in definition. It was discovered by Messier in 1764, and thus described: "A small nebula, no star; light faint; form round, and may be seen with a telescope $3\frac{1}{2}^{\text{ft}}$ long." From γ Ophiuchi it is S. by W. about 6½°, being nearly midway between β Scorpii and the tail of Aquila, and 16° due S. of α Ophiuchi. Sir W. Herschel resolved this object in 1783, with his 20$^{\text{ft}}$ reflector, and he thus entered it: "Extremely bright, round, easily resolveable; with 300 I can see the stars. The heavens are pretty rich in stars of a certain size, but they are larger than those in the cluster, and easily to be distinguished from them. This cluster is considerably behind the scattered stars, as some of them are projected upon it." He afterwards added: "From the observations of the 20$^{\text{ft}}$ telescope, which in 1791 and 1799 had the power of discerning stars 75·08 times as far as the eye, the profundity of this cluster must be of the 900th order." "It resembles the 10th *Connaissance des temps*, which probably would put on the same appearance as this, were it removed half its distance farther from us." For 10 M., see No. 1136, *ante.*

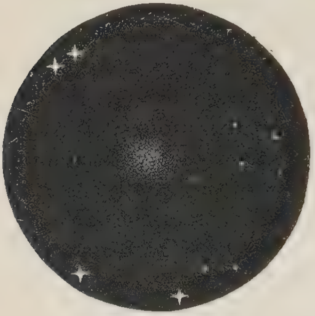

FIG. 37. 14 M. OPHIUCHI.

1185. **568 Dunlop SCORPII.** **(h. 3696; H. 4313.)**

		h.	m.	s.			s.
R. A.		17	32	4	Prec.	+	4·06
		°	′				″
Decl.	S	36	52·4		——	S	2·44

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p Ri; i R; st 9 . . . 10;" which means:—"a cluster; pretty large; pretty rich; irregularly round; the stars are chiefly of the 9th and 10th magnitudes."

1186. **6 M. OPHIUCHI.** **(h. 3699; H. 4318.)**

		h.	m.	s.			s.
R. A.		17	32	53	Prec.	+	3·90
		°	′				″
Decl.	S	32	18·3		——	S	2·36

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"cl; L; i R; l C; st 7, 10 . . .;" which means:—"a cluster; large; irregularly round; not much condensed; there is a star of the 7th magnitude in it, but the component stars generally range from the 10th magnitude downwards."

1187. 2191 Σ. OPHIUCHI.

		h.	m.	s.			s.
R. A.		17	33	56	Prec.	+	3·18
Decl.	S	4°	54′·4		——	S	2″·28

	Position.	Distance.	Epoch.
STRUVE, W.	268°·2	26″·4	1831·48
MAIN	267·0	25·6	1865·43
STONE, O.	267·8	26·5	1879·02

A double star. A 7½, white; B 8½, white. Relatively fixed. There is a very faint star 5″ or 6″ from B.

1188. 41 Ħ. VI. DRACONIS. (H. 4321.)

		h.	m.	s.			s.
R. A.		17	35	12	Prec.	+	2·18
Decl.	N	75°	47′·6		——	S	2″·16

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“⊕; c L; R; vgb M; rr;” which means:—“a globular cluster; considerably large; round; very gradually brighter in the middle; partially resolved—some stars visible.”

1189. 200 P. XVII. HERCULIS. (Σ. 2194.) DCXXII.

		h.	m.	s.			s.
R. A.		17	36	34	Prec.	+	2·46
Decl.	N	24°	34′·0		——	S	2″·05

	Position.	Distance.	Epoch.
HERSCHEL, W.	353°·8	14″·3	1783·23
SOUTH	8·9	17·2	1825·00
SMYTH	9·5	16·3	1830·71
SEABROKE	9·8	16·3	1874·63

A neat double star, in the space S. of the hero's right arm, where it lies in a nest of half a dozen stars, two-thirds of the way from *a* Lyræ towards *a* Herculis. A 6½, topaz yellow; B 9, purple; a third star at a distance in the *sf* quadrant. The above measures imply a great orbital change to have taken place in 42^{y}. But there is reason to suppose that Ħ. may have intended to note *nf* position, instead of *np;* which error of quadrant makes a direct difference of 12° 24′ in the angle.

[“A good low-power field follows.”—*Webb.*]

1190. 612 Dunlop SAGITTARII. (h. 3702; H. 4323.)

	h. m. s.		s.
R. A.	17 37 6	Prec. +	3·91
	° ′		″
Decl.	S 32 18·1	—— S	2·00

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; Ri; l C;" which means:—"a cluster; very large; rich; not much compressed."

1191. 3702a h. SAGITTARII. (H. 4324.)

	h. m. s.		s.
R. A.	17 38 29	Prec. +	3·96
	° ′		″
Decl.	S 33 38·5	—— S	1·88

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; p Ri; st 8 . . . 12;" which means:—"a cluster; very large; pretty rich; the component stars range from the 8th to the 12th magnitudes."

Engraved, *Cape Obs.*, Pl. v. Fig. 1.

1192. 61 OPHIUCHI. (Σ. 2202.) DCXXIII.

	h. m. s.		s.
R. A.	17 39 3	Prec. +	3·01
	° ′		″
Decl.	N 2 37·6	—— S	1·83

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	90·0	19·0	1781·55
Smyth	93·9	20·7	1833·53
Mädler	94·5	20·1	1852·63
Gledhill	93·5	20·8	1874·57
Jedrzejewicz	93·5	20·2	1877·15

A neat double star below *β*, on the Serpent-bearer's left shoulder, where it is 2° S. of the bright star *β*, which lies about 7° S. by E. of *a* Ophiuchi. [A 6½; B 7]; both silvery white. In the first registry of the measures, H̥. mentions the position as a mere estimation, "almost exactly following;" but this suffices to indicate fixity.

[Webb noted the preceding star to be considerably larger than the other in 1850. Fletcher in 1851 made them to be 6 and 7, and both yellow.]

1193. 7413 Lac. ARÆ. (*h. 4975.)

	h.	m.	s.			s.
R. A.	17	39	28	Prec.	+	5·00
		°	′			″
Decl.	S	55	22·0	——	S	1·80

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	115·7	...	*not stated*	...	1835·37
Herschel, J.	81·3	...	1·51	...	1837·66

A double star. A 6½; B 10. "Probably a binary star in a rapid state of angular change."—(*Sir J. Herschel.*) I am not acquainted with any other measures.

1194. 2218 Σ. DRACONIS.

	h.	m.	s.			s.
R. A.	17	39	36	Prec.	+	0·37
		°	′			″
Decl.	N	63	43·2	——	S	1·78

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	359·9	...	2·78	...	1831·36
Struve, W.	355·1	...	2·47	...	1836·78
Secchi	353·3	...	2·30	...	1857·53
Dunér	352·1	...	2·08	...	1872·34

A double star. A 7, white; B 8½, ash. A decrease of both angle and distance seems probable.

1195. μ HERCULIS. (Σ. 2220.) DCXXIV.

	h.	m.	s.			s.
R. A.	17	42	10	Prec.	+	2·37
		°	′			″
Decl.	N	27	47·7	——	S	1·56

	Position.		Distance.		Epoch.
	°		″		
South	240·8	...	29·3	...	1825·50
Smyth	241·8	...	30·1	...	1837·67
Mädler	242·9	...	30·2	...	1851·89
Struve, O.	244·6	...	32·4	...	1860·30
Flammarion	245·1	...	31·1	...	1877·75
Jedrzejewicz	243·9	...	31·2	...	1878·56

A delicate double star, in the bend of the Theban's right arm; 14° distant from α Lyræ, to the S.W., and preceding β Cygni by about 26°, exactly on the parallel. A 4, pale straw-colour; B 10, cerulean blue. This is difficult to measure, especially in distance, from its bearing illumination badly. Still the results are coincident.

μ Herculis has a very sensible proper motion.

[B was discovered by Alvan Clark in 1856 to be double, and numerous observations since that time show that B's companion C, which is of mag. 11, is in rapid motion round B. Doberck finds a period of 54·2^y.

B. C.

	Position.		Distance.		Epoch.
	°		″		
Dawes	59·2	...	1·81	...	1857·50
Struve, O.	98·7	...	0·88	...	1868·50
Struve, O.	185·5	...	0·63	...	1873·50
Burnham	245·9	...	0·96	...	1880·47]

1196. 2215 Σ. HERCULIS.

	h. m. s.		s.
R. A.	**17 42 28**	Prec. +	3·87
	° ′		″
Decl.	**N 17 43·8**	—— S	1·53

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	310·6	...	0·74	...	1831·53
Struve, O.	311·6	...	0·85	...	1841·56
Secchi	304·6	...	0·66	...	1855·92
Dunér	307·0	...	0·74	...	1868·45
Burnham	301·1	...	0·71	...	1878·62

A double star. A 6, white; B 8½, ash-coloured. The angle seems decreasing: nevertheless the measures are not very harmonious.

1197. 557 Dunlop TELESCOPII. (h. 3705; H. 4332.)

	h. m. s.		s.
R. A.	**17 42 44**	Prec. +	4·07
	° ′		″
Decl.	**S 37 0·8**	—— S	1·51

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; p L; R; vgmb M; rrr; st 18 ... 20;" which means:—"a globular cluster; very bright; pretty large; round; very gradually much brighter in the middle; well resolved—clearly seen to consist of stars; which are very small, ranging from the 18th to the 20th magnitudes." Follows γ Telescopii (=B.A.C. 6018) a 4th mag. star by 23^s, and 22″ to the S.

1198. 597 (?) Dunlop SAGITTARII. (h. 3706; H. 4334.)

	h. m. s.		s.
R. A.	**17 42 55**	Prec. +	4·00
	° ′		″
Decl.	**S 34 49·5**	—— S	1·50

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; v L; v Ri; st 12 . . . 13;" which means:—"a cluster; very large; very rich; the component stars are chiefly of the 12th and 13th magnitudes."

1199. 13 H. VI. SAGITTARII. (h. 3707; H. 4335.)

R. A.	17h.	43m.	35s.	Prec. +	3s·85
Decl.	S 30°	10′·9		—— S	1″·44

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p Ri; bifid; st 12;" which means:—"a cluster; pretty large; pretty rich; bifid [=with a rift in the middle]; the stars are chiefly of the 12th magnitude."

Engraved, *Cape Obs.*, Pl. v. Fig. 5.

1200. ψ¹ DRACONIS. (Σ. 2241.) DCXXV.

R. A.	17h.	43m.	54s.	Prec. —	1s·09
Decl.	N 72°	12′·5		—— S	1″·41

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	15·0	...	30·9	...	1832·34
SMYTH	14·9	...	31·3	...	1838·37
DUNÉR	15·4	...	30·9	...	1869·57
JEDRZEJEWICZ	14·6	...	30·9	...	1876·90

A neat double star, near the middle of the Dragon's back; it is easily identified, being on the same parallel with γ Ursæ Minoris, the following of the two Guards, and about one-third of the distance from that star towards β Cephei. A $5\frac{1}{2}$, and B 6, both pearly white.

1201. 7 M. SAGITTARII. (h. 3710; H. 4340.)

R. A.	17h.	46m.	40s.	Prec. +	4s·00
Decl.	S 34°	47′·2		—— S	1″·16

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v B; p Ri; l C; st 7 . . . 12;" which means:—"a cluster; very bright; pretty rich; little compressed; the component stars range from the 7th to the 12th magnitudes."

1202. 1989 h. HERCULIS. (H. 4343; ℍ.)

R. A. $17^{h}\ 47^{m}\ 12^{s}$	Prec. + $2^{s}\cdot50$
Decl. N $23^{\circ}\ 6'\cdot2$	—— S $1''\cdot12$

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“!; v F; S; R; vsvmb M v S R N;” which means:—“a remarkable object; very faint; small; round; very suddenly very much brighter in the middle where there is a small round nucleus.”

Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 42; Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. vii. Fig. 31.

1203. 23 M. OPHIUCHI. (h. 1990; H. 4346.) DCXXVI.

R. A. $17^{h}\ 50^{m}\ 28^{s}$	Prec. + $3^{s}\cdot53$
Decl. S $18^{\circ}\ 58'\cdot9$	—— S $0''\cdot83$

A loose cluster in the space between Ophiuchus's left leg and the bow of Sagittarius. This is an elegant sprinkling of telescopic stars over the whole field, under a moderate magnifying power; the most clustering portion is oblique, in a direction *sp* and *nf*, with a 7th magnitude star in the latter portion. The place registered is that of a neat pair, of the 9th and 10th magnitudes, of a lilac hue, and about 12″ apart. This object was discovered by Messier in 1764, and it precedes a rich out-cropping of the Milky Way. From μ Sagittarii it bears N.W., distant about 5°, the spot being directed to by a line from σ on the shoulder, through μ at the tip of the bow.

After having examined this object, I lowered the telescope a couple of degrees, and gazed for the curious trifid nebula, 41 ℍ. IV. [No. 1210, *post*]; but though I could make out the delicate triple star in the centre of its opening, the nebulous matter resisted the light of my telescope, so that its presence was only indicated by a peculiar glow. [Burnham finds the triple easy with less than 6^{in} of aperture.]

1204. 460 (?) Dunlop TELESCOPII. (h. 3715; H. 4347.)

R. A. $17^{h}\ 51^{m}\ 2^{s}$	Prec. + $4^{s}\cdot37$
Decl. S $44^{\circ}\ 14'\cdot3$	—— S $0''\cdot79$

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“Neb + Cl; p L; m E; gvlb M;” which means:—“a nebula and cluster conjoined; pretty large; much extended; gradually very much brighter in the middle.”

1205. 9 B. TAURI PONIATOWSKII. (Σ. 2244.)

	h.	m.	s.		s.
R. A.	**17**	**51**	**26**	Prec. +	3·07
		°	′		″
Decl.	**N**	**0**	**5·1**	—— S	0·75

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	272·7	...	1·05	...	1830·92
Stone, O.	275·1	...	1·06	...	1878·89

A double star. A 7½, white; B 8, white.

1206. 300 P. XVII. HERCULIS. (Σ. 2245.) DCXXVII.

	h.	m.	s.		s.
R. A.	**17**	**51**	**34**	Prec. +	2·63
		°	′		″
Decl.	**N**	**18**	**20·6**	—— S	0·74

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	115·3	...	2·99	...	1830·50
Smyth	114·9	...	2·5	...	1835·61
Dunér	115·5	...	2·5	...	1869·69

A close double star, in the space between the hero's head and the Eagle's tail; it is 7½° N.N.E. of α Ophiuchi, or one-quarter of the distance from that star towards γ Lyræ. A 7½, and B 8, both lucid white. Both Σ. and H. make the components equal in magnitude, but on a very careful comparison I cannot but think B the smaller.

1207. 294 P. XVII. SAGITTARII. (*h. 5003.)

	h.	m.	s.		s.
R. A.	**17**	**52**	**0**	Prec. +	3·84
		°	′		″
Decl.	**S**	**30**	**14·9**	—— S	0·70

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	107·1	...	6·2	...	1836·76
Stone	105·6	...	5·6	...	1877·60

A double star. A 6, strong yellow; B 7½, strong yellow.

1208. γ DRACONIS. DCXXIX.

	h.	m.	s.		s.
R. A.	**17**	**54**	**3**	Prec. +	1·39
		°	′		″
Decl.	**N**	**51**	**30·1**	—— S	0·41

	Position.		Distance.		Epoch.
	°		″		
Burnham	116·3	...	124·7	...	1879·27

A *Nautical Almanac* star, with a telescopic companion, on the crown of the Dragon's head. A 2, orange tint; B 12. [Burnham sees 3 other stars nearer, viz. at $20''$; $47''$; and $56''$ respectively.] A is the Etamin of the Catalogues, from *rás-el-tannín*, the dragon's head; it may be readily found by its being nearly in mid-distance between Polaris and α Ophiuchi. A line from α Lyræ to γ Ursæ Majoris also passes through it, and points γ as the following star to β Draconis; the two latter, with its immediate northern neighbours, forming an irregular square, which constitute the Dragon's head. The Alphonsine Tables term this star Rasaben, which some have viewed as a corruption of Etamin; but Scaliger rightly points it out as *Rás-al-thu'bán*, head of the devouring basilisk. The rhymster shows the monster's extent:

A line from Dubhe, in the Bear, sent right the Guards between,
The stars which form the Dragon's tail in midway will be seen.
Far to the east the body winds, where Lyra's lustres glow,
A ray from Wega to the Pole, its lozenge-head will show.

This star affords another proof of the defective state of the degrees of brightness; for Ptolemy registered it γ in magnitude, and has been followed by Ulugh Beigh, Tycho, and La Caille; Hevelius, De Zach, and Groombridge called it $2\frac{1}{2}$; and Flamsteed, Bradley, Mayer, and Piazzi elevated it to the 2nd rank. In my own comparisons, it appears small for its class.

γ Draconis is a valuable star, from passing very near the zenith of the south of England; and it is celebrated as being the one by which the important discovery of the aberration of light was made. The exertions of Bradley and his friend Molyneux to find its distance from us, are too well known to need repetition; but in the course of them, the fact was established, that "if light is propagated in time, the apparent place of a fixed object will not be the same when the eye is at rest, as when it is moving in any other direction than that of the line passing through the eye and the object; and, that when the eye is moving in different directions, the apparent place of the object will be different." It is recorded that these *savans* were embarrassed beyond measure when, instead of an indication of parallax, they found a regular motion directly opposite to what they expected, which baffled both theory and conjecture. At length one day, when Dr. Bradley was enjoying the then usual and laudable feat of sailing about on the Thames, he observed every time the boat tacked, the direction of the wind, estimated by the direction of the vane, seemed to change. Here was another εὕρηκα, and one even more deserving the sacrifice of a hecatomb than that of Archimedes; the perplexity vanished, and the phenomenon was found to be an optical illusion occasioned by a combination of the motion of light with the motion of his telescope while observing the polar stars. In a word, he enriched Astronomy by the weighty announcement, that "all the phenomena proceeded from the progressive motion of light and the Earth's annual motion in its orbit," or, as he afterwards called it, from the "aberration of light." Having thus detected the existence of this effect, he also determined its constant at 20″, whence it followed that the interval of time in which light travels from the Sun to the Earth is = $8^m\ 7^s$.

It is very interesting, among other circumstances connected with the important discovery of ABERRATION, that the original entry of the first night's observation at Kew, which confirmed the fact of an unexplained motion in the star before us, is preserved in Bradley's own handwriting. It is written on an old scrap of paper, and dated 21st December, 1725: an excellent facsimile of it is given by Professor Rigaud, in his volume on the *Miscellaneous Works and Correspondence* of Bradley.

Being a Greenwich zenith-star, and therefore little affected by refraction, γ Draconis was employed by our astronomers to ascertain the parallax of the Earth's orbit, and thus determine our distance from the fixed stars. Hooke attacked it at Gresham College, with a 36^{ft} telescope, in 1669; and 20 years afterwards Flamsteed opened trenches in the same cause. From the united results thus obtained, Whiston concluded the parallax to be 47″, and that a cannon-ball could not have reached the star in $160{,}000^y$, though moving 500 miles an hour. But we now know pretty well that the said ball would not have got over the fortieth part of its journey. The celebrated operations of Molyneux and Bradley followed; but though the observations were of the most rigorous exactness, on a base of 190 millions of miles, they proved in the result that the parallax was a quantity not cognisable by any astronomical instrument then used, however accurately constructed. Had the parallax amounted to a single second, Bradley considered he should have detected it; his conclusion therefore was, that it did not amount to so much, and consequently, that γ Draconis is above 400,000 times farther from us than the Sun. Such were the approaches towards a barrier which has now been passed, and the apparently insurmountable obstacles to ascertaining the wonderful distance of the stars are now prostrate before observation and computation. But this, as we shall presently see, was not effected by Bradley's method; zenith distances are so charged with errors of nutation, aberration, and instrumental irregularities, as to make an angle difficult to pronounce upon within a second. [See 61 Cygni.]

The term Zenith-star, which γ Draconis has obtained at Greenwich, is rather relative than real; for no star has yet been actually observed in the zenith of any observatory, the most interesting of all the points in the apparent concavity of the visible hemisphere. If the Earth had no annual or diurnal motion, nor any nutation of its axis, the zenith of each place on the Earth's surface would be so many fixed points in the heavens; but as we cannot control either of these elements, the actual zenith of every place is continually changing, so that the true zenith must be singled out from the succession of apparent ones generated in the heavens by the Earth's diurnal motion on its axis. Means might be taken under the equator to reduce the problem to a simple condition.

While on this subject, it may be noted that ζ Draconis is the perpetual zenith-star of Jupiter, whence, from the vast flattened expanse of that planet, it meets Sir A. Hunt's verses better than does our own Polaris:

> Where in the zenith shines the polar star,
> And the cold sun looks dimly from afar,
> Obliquely skims the drear horizon round,
> And flings Periscian shadows on the ground.

1209. 67 OPHIUCHI. DCXXVIII.

		h.	m.	s.			s.
R.A.		17	55	8	Prec.	+	3·00
		°	′				″
Decl.	N	2	56·2		——	S	0·43

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	143·1	55·2	1823·41
MAIN	*not given*	54·8	1861·46
DEMBOWSKI	142·8	54·7	1874·00

A wide double star, in the space between Ophiuchus and Taurus Poniatowski, at the distance of $4\frac{1}{2}$° to the E.S.E. of β Ophiuchi. A 4, straw-colour; B 8, purple. Piazzi described it, "Duplex. Comes 2″ temporis sequitur 50″ circiter ad austrum." This star is designated by the Greek letter *o* in the British and other Catalogues; "but," says Baily, "there is no such star in Bayer's Map; I have therefore rejected it."

["At a short distance *p*, a little S. must be H.'s 'very fine orange star,' 7·5 mag."—*Webb.* This is 422 Birmingham, R.A. $17^{h}\ 52^{m}\ 32^{s}$; Decl. + 2° 44·0′.]

1210. 20 M. SAGITTARII. (h. 1991, 3718; H. 4355.)

		h.	m.	s.			s.
R.A.		17	55	41	Prec.	+	3·64
		°	′				″
Decl.	S	23	1·8		——	S	0·38

A very large and important nebula, or rather group of nebulæ. Messier treated it as a single object, but Sir W. Herschel catalogued it in 4 portions, respectively, No. 41 of his 4th class, and Nos. 10, 11, 12 of his 5th class. In Sir J. Herschel's *Catalogue* of 1864 he thus summarised it :—" !!! ; v B ; v L ; trifid ; ⁑ involved ;" which represents :—" very remarkable ; very bright ; very large ; trifid ; double star involved." In his *Outlines of Astronomy* Sir John gives a more definite description as follows :—" One of them is singularly trifid, consisting of 3 bright and irregularly-formed nebulous masses, graduating away insensibly externally, but coming up to a great intensity of light at their interior edges, where they enclose and surround a sort of three-forked rift or vacant area, abruptly and uncouthly crooked, and quite void of nebulous light. A beautiful triple star is situated precisely on the edge of one of these nebulous masses, just where the interior vacancy forks out into two channels." (See No. 1203, *ante;* and paper by Holden, *Amer. Jour. Sc.*, New Series, vol. xiv. pp. 433–58.)

Engraved in *Phil. Trans.*, 1833, Fig. 80 ; *Cape Obs.*, Pl. ii. Fig. 2 ; Mason, *Trans. Amer. Acad.*, vol. vii. ; Lassell, *Mem. R. A. S.*, vol. xxxiii. Pl. i ; xxxvi. Pl. viii. Fig. 32 ; Trouvelot, *Annals Harv. Coll. Obs.*, vol. viii. Pl. 32.

1211. 49 Ħ. I. SAGITTARII. (h. 3720 ; H. 4359.)

	h.	m.	s.			s.
R. A.	17	56	32	Prec.	+	3·84
		°	′			″
Decl.	S	30	1·7	——	S	0·30

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864 :— " ⊕ ; B ; p L ; R ; gvmb M ; rrr ; st 16 . . . 17 ;" which means :—" a globular cluster ; bright ; pretty large ; round ; gradually very much brighter in the middle ; well resolved ; clearly seen to consist of stars ; which are as small as the 16th and 17th magnitudes."

1212. 95 HERCULIS. (Σ. 2264.) DCXXXI.

	h.	m.	s.			s.
R. A.	17	56	50	Prec.	+	2·54
		°	′			″
Decl.	N	21	35·8	——	S	0·28

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	265·8	...	6·1	...	1780·69
Struve, W.	261·7	...	6·0	...	1829·90
Smyth	261·8	...	6·1	...	1833·78
Dunér	260·8	...	6·0	...	1869·48
Jedrzejewicz	259·9	...	6·1	...	1880·66

A neat double star, between the Theban's head and the Eagle's tail, in the spot where Hevelius placed his Cerberus ; it is 10° distant from α Ophiuchi on a N.N.E. line, which leads upon β Lyræ. A 5½, light apple-green ; B 6, cherry-red,—besides which there are two small stars in the *sp* quadrant, and a 7th magnitude in the *np*. This beautiful object presents a curious instance of difference in colour between components so nearly equal in brightness. Indeed, it was only on rigid comparison that I was induced to mark the following star half a magnitude smaller than the preceding one, for the other observers note them as of the same size. Piazzi says, "Duplex. Comes ejusdem magnitudin. parumper ad boream sequitur." [A friend of Smyth's—Mr. J. Higgens of Bedford—declared in 1863 that the *intensity* of the green and of the red colours of A and B varied very obviously from time to time, and that at the period of recovery, the green star is the first to recover its full normal hue. On this statement being submitted to Sir G. B. Airy he did not view it with favour.]

From a comparison of the early epochs, there was a hope of 95 Herculis being a binary system, but the later measures go far to prove the object to be optical, and that the proximity of the stars is merely apparent, no connexion existing between them.

1213. τ OPHIUCHI. (Σ. 2262.) DCCXXX.

	h. m. s.		s.
R. A.	17 57 5	Prec. +	3·26
	° ′		″
Decl.	S 8 10·7	— S	0·25

		Position.	Distance.	Epoch.
		°	″	
Struve, O.	A B	223·1	0·94	1840·51
Struve, O.	A B	238·2	1·19	1851·67
Secchi	A B	245·8	1·30	1860·77
Dembowski	A B	247·8	1·42	1870·50
Plummer	A B	249·8	1·64	1876·55
Burnham	A C	126·8	100·53	1879·37
Stone, O.	A B	250·1	1·78	1879·41
Jedrzejewicz	A B	252·2	1·89	1880·67

A binary star (*vicinissima*) with a companion in the *sf* quadrant, on the Serpent-bearer's left hand; it is 15° to the N.E. of the bright star η Ophiuchi, on the line towarda α Aquilæ. A 5, and B 6, both pale white; C 10, light blue; two other stars in the field. This is a most difficult object, and when discovered in April, 1783, it was merely wedge-shaped, and esteemed by Sir W. Herschel "the closest of all his double stars." The more we study this active astronomer's labours, the more we are lost in admiration of his zeal and power.

[The angle is steadily increasing, and so is the distance; and the binary character of this object is now established beyond a doubt. Doberck in 1875 assigned a period of 217^{y}, finding an orbit which agreed very satisfactorily with the recorded observations.]

1214. 8 M. SAGITTARII. (h. 3722; H. 4361.)

	h.	m.	s.		s.
R. A.	17	57	8	Prec. +	3·67
		°	′		″
Decl.	S	24	22·6	—— S	0·25

A very singular nebula, thus described by Sir J. Herschel in his *General Catalogue* :—" !!! ; v B ; e L ; e i F ; with L Cl ;" which means :—"very remarkable; very bright; extremely large; extremely irregular figure; with large cluster." Webb's account is as follows :—" Splendid Galaxy object; visible to naked eye. In a large field we find a bright coarse triple star, followed by a resolveable luminous mass, including 2 stars, or starry centres, and then by a loose bright cluster, enclosed by several stars: a very fine combination. H. A set of milky streaks and loops. Secchi suspects change, and finds the spectrum gaseous." Sir J. Herschel in his *Outlines of Astronomy* has given a more full description as follows :—" A collection of nebulous folds and masses, surrounding and including a number of oval dark vacancies, and in one place coming up to so great a degree of brightness as to offer the appearance of an elongated nucleus. Superposed upon this nebula, and extending in one direction beyond its area, is a fine and rich cluster of scattered stars, which seem to have no connexion with it, as the nebula does not, as in the region of Orion, show any tendency to congregate about the stars." Engraved in *Cape Obs.*, Pl. i. Fig. 1.

1215. 3725 h. SAGITTARII. (H. 4366.)

	h.	m.	s.		s.
R. A.	17	57	56	Prec. +	3·67
		°	′		″
Decl.	S	24	20·6	—— S	0·18

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864 :—"Cl ; B ; L ; p Ri ; v L neb p ;" which means :—" a cluster; bright; large; pretty rich; a very large nebula precedes." The very large nebula here mentioned is 8 M. (see *ante*).

1216. 21 M. SAGITTARII. (h. 1993; H. 4367.) DCXXXII.

	h.	m.	s.		s.
R. A.	17	58	2	Prec. +	3·62
		°	′		″
Decl.	S	22	30·8	—— S	0·16

	Position.		Distance ~~Difference of R. A.~~		Epoch.
	°		″		
SOUTH	317·4	...	30·9	...	1825·5

A coarse cluster of telescopic stars, in a rich gathering galaxy region, near the upper part of the Archer's bow; and about the middle is the conspicuous pair above registered,—A being 9, yellowish, and B 10, ash-coloured. This was discovered by Messier in 1764, who seems to have included some bright outliers in his description, and what he mentions as nebulosity must have been the grouping of the minute stars in view. About 2½° N.E. of μ Sagittarii.

1217. 37 ♅. IV. DRACONIS. (H. 4373; ℜ.) DCXXXV.

	h.	m.	s.			s.
R. A.	17	58	35	Prec.	−	0·03
	°	′				″
Decl.	N	66	38·0	——	S	0·13

A planetary nebula, between the first twist in the Dragon's body and his head; a fancied line from Polaris to γ Draconis passes through it in nearly mid-distance, and it makes a triangle, rectangular and isosceles, with the Pole-star and β Ursæ Minoris, the northernmost of the two Guards, the right angle being at β. This is a remarkably bright and pale blue object, and was described by its discoverer ♅. as having a disc about 35″ in diameter, but with very ill-defined edges. There are several telescopic stars in the field, and the annexed diagram affords a notion of its aspect.

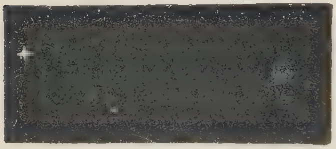

FIG. 38. 37 ♅. IV. DRACONIS.

The nebula before us is situated in the pole of the ecliptic, whence, being easily found, and always above the horizon, it becomes an object of much interest and utility.

The poles of the ecliptic, it will be remembered, are those points in the heavens which are farthest distant from the plane of the Earth's orbit; and as the ecliptic holds so determinate a position in Uranography, the situation of those poles is of paramount theoretic importance. But, for several reasons, the use of the equinoctial poles has been preferred in every-day practice.

[" Very curious: there is a bright star in the centre of the nebula, which appears to have escaped Smyth."—*Brodie.*]

1218. 2273 Σ. DRACONIS.

	h.	m.	s.			s.
R. A.	17	58	39	Prec.	+	0·31
	°	′				″
Decl.	N	64	8·9	——	S	0·12

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	284·7	...	20·5	...	1832·49
MAIN	282·0	...	20·5	...	1864·28

A double star. A 7½, yellowish white; B 8, bluish white.

1219. 70 OPHIUCHI. (Σ. 2272.) DCXXXIII.

	h. m. s.			s.
R. A.	17 59 53	Prec.	+	3·01
	° ′			″
Decl. N	2 32·5	——	S	0·01

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	168·4	...	4·66	...	1819·63
SMYTH	136·4	...	5·43	...	1830·76
DAWES	124·8	...	6·62	...	1840·59
JACOB	115·1	...	6·86	...	1850·48
AUWERS	107·9	...	6·49	...	1860·74
TALMAGE	94·4	...	4·62	...	1870·60
DOBERCK	75·4	...	3·03	...	1878·54
JEDRZEJEWICZ	62·8	...	2·74	...	1880·65

A binary star in the space between the left shoulder of Ophiuchus and the Serpent's tail, in a rich vicinity; and about 6° to the E.S.E. of the bright star β Ophiuchi. A 4½, pale topaz colour; B 7, violet, —and these two point upon a third star, of the 12th magnitude, in the *sf* quadrant. There is also a little *comes* in the *sp*, preceding A by 5·5s.

This very interesting object has so remarkable an angular velocity, and has undergone such an appreciable alteration of distance, that I strongly urge such as investigate those extraordinary systems to peruse the elaborate and able discussions of its orbit by Encke, Sir J. Herschel, and Mädler. To these a few words may be added in illustration.

70 Ophiuchi was designated by the letter *p* in the *British Catalogue*; but, as there is no such letter in Bayer's Map, Baily rejected it in his edition of Flamsteed. It was thus mentioned by its discoverer, Sir W. Herschel:—"The alteration of the angle of position that has taken place in the situation of this double star is very remarkable. October 7, 1779, the stars were exactly in the parallel, the preceding star being the largest; the position, therefore, was 0° 0′ following. September 24, 1781, it was 9° 14′ *nf;* and May 29, 1804, it was 48° 1′ *np;* which gives a change of 131° 59′ in 24 years and 234 days. This cannot be owing to the effect of systematical parallax, which could never bring the small star to the preceding side of the large one." To this important passage H. stamps additional value by telling us it is particularly written, in his father's MS. observations, that the two stars run together

along the equatorial hair. With such a starting-point, it has been tolerably easy to watch the general relations of this system, however involved the computations have proved, from their extreme delicacy.

The process by which the elliptical elements of the orbits of binary stars may be obtained with comparative facility is clearly described by Sir J. Herschel in a paper on the investigation of those orbits, published in *Memoirs R. A. S.*, vol. v.

The investigation of this rapid revolver's path occasioned both trouble and disquietude to H. In comparing the formulæ with observations, he found the only irreconcileable contradiction to the curve was offered by Struve's measures in 1818, 1819, 1825, 1826, 1827, and 1828. On which he says, "I have already had occasion to observe on the smallness of some of this eminent observer's distances as compared with my own. Whatever be the cause, whether accidental and limited to the particular cases, or general and extending over masses of observation, I trust he will pardon me for noticing it (in no spirit of evil cavil), as deserving careful examination on both our parts." Such was the temperate yet strong comment of one who justly takes the highest rank in practical and theoretic astronomy; and who endeavoured to reap the utmost value of all the observations which presented themselves, during his analytical treatment, to disentangle the quæsita from the data. To facilitate the numerical calculations of this and other orbits, for which Sir John, *mirabile dictu*, professes a great inaptitude, he invented and adopted a mechanical contrivance, which gives, by simple inspection and reading off, the solution of the transcendental equation

$$u-e.\ \sin u=n\ (t-\tau)$$

for any given value of its right-hand member. I was greatly amused by an examination of this ingenious machine at Slough, shortly after it was made; for notwithstanding the sublimity of its purpose, it was both simple and rude, apparently constructed from the ruins of a Dutch clock and a kitchen jack. With proper practical modifications, it applies to a large class of transcendental equations, of which this is only a particular and the simplest case.

Struve displayed a very laudable anxiety to ascertain the exact value due to the results of his measures, and whether any constant error pervaded his observations. The perfect accordance as to angular position, whether measured on the Continent or in England, satisfied that indefatigable astronomer that not a doubt can be entertained of their general correctness, for, in a letter to M. D'Ouvaroff, he says they prove "clairement qu'il ne se trouve dans ces directions aucune source d'erreur de cette nature et de quelque importance." It was otherwise with respect to distances. On comparing the results obtained by the Fraunhofer refractor with his own former observations, and those of Sir J.

Herschel, Sir J. South, and Dawes, he found the great telescope made the measures smaller than the others. He therefore insisted that the wire micrometer, by an optical perturbation, must necessarily give all the distances too great, especially with regard to the closest stars; and the evil, he holds, is aggravated according to the comparative weakness of the telescope. But experience has shown that the Professor's argument cannot be wholly admitted; and that the *disturbing cause* is not yet shown.

Not satisfied with careful reductions, comparison, and reasoning, Struve resolved upon the most rigorous test yet devised. "In 1830," he says, "I agreed with Bessel, of Königsberg, to observe several stars in common. He has a magnificent heliometer, which forms the ornament of that observatory. The principle on which measures are taken with that instrument is totally different from that of the wire micrometer. An identity of distance given by the two observers would have been an irrefragable proof of their correctness; but a comparison of the distances of 39 stars, taken by both, shows that those of Dorpat are, on an average, 0·19″ smaller than those of Königsberg. If I can assert with certainty that the Dorpat telescope is so superior in measuring distances that the non-accordance of results indicates an imperfection in the anterior measures, we must also grant that the Königsberg heliometer, though of considerably less optical power than the Dorpat tube, must still be placed in the same rank as a means of measuring. Observations made with such an instrument, and by such an astronomer as M. Bessel, are of the greatest weight." Consequently, in order to detect the hidden source of the error, M. Struve afterwards made numerous researches, and arrived at satisfactory results [1].

[The orbit of 70 Ophiuchi has during the last few years received the attention of several eminent astronomers. The following elements are given by Schur (*Ast. Nach.*, 1681):—

Peri-astron passage	T	= 1808·79
Longitude of peri-astron . . .	π	= 281·1°
Longitude of Ascending Node . .	☊	= 125·4°
Inclination	ι	= 57·9°
Eccentricity	ϵ	= 0·49149
Mean Annual Motion . . .	μ	= −3·81°
Semi-axis major	a	= 4·704″
Period		= 94·37$^{y.}$

Schur's period does not differ much from the others, which are:—Sir J. Herschel, 80·34^{y}; Mädler, 80·61^{y}; Hind, 87·52^{y}; and Jacob, 88·48^{y}. Encke gave 73·76^{y}, but that was obtained a good many years ago. Sir J. Herschel noted that the rings round the telescopic image of this star "seem to have something peculiar about them: they are thin, and extend further than in general."]

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[1] Admiral Smyth does not further explain to what he is here making allusion.

1220. 473 Dunlop TELESCOPII. (h. 3726; H. 4372.)

	h.	m.	s.			s.
R.A.	18	0	1	Prec.	+	4·35
		°	′			″
Decl.	S	43	43·4	——	N	0·01

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; R; e C; gb M; rrr; st 15 . . . 16;" which means:—"a globular cluster; bright; round; extremely condensed; gradually brighter in the middle; well resolved—clearly seen to consist of stars, which are chiefly of the 15th and 16th magnitudes." Sir J. Herschel in the Notes to his *General Catalogue* mentions a singular statement respecting this nebula made by Cacciatore in *Ast. Nach.*, 113, but as Sir John seems to attach no great importance to it I pass it over.

1221. 401 B. HERCULIS. (Σ. 2277.)

	h.	m.	s.			s.
R.A.	18	0	16	Prec.	+	1·56
		°	′			″
Decl.	N	48	28·0	——	N	0·02

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	117·9	27·6	1830·06
Mädler	118·6	26·9	1844·90
Dembowski	119·9	27·7	1857·70
Dunér	120·3	27·0	1871·49

A double star. A 6½, white; B 9. If the above measures are to be trusted the angle is increasing.

1222. 362 P. XVII. TAURI PONIATOWSKII. (Σ. 2276.)

DCXXXIV.

	h.	m.	s.			s.
R.A.	18	0	36	Prec.	+	2·78
		°	′			″
Decl.	N	11	59·7	——	N	0·05

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	260·3	7·6	1782·46
Smyth	257·9	6·9	1838·56
Dunér	259·5	6·5	1870·06

A neat double star, in the space between the Polish bull and the

Eagle's wing, being 8° to the E. of *α* Ophiuchi, in the line towards *α* Aquilæ. A 8, straw-colour; B 8½, sapphire blue. The preceding component is certainly the smallest; but Piazzi, who registered A of the 8th degree of brightness, says, "Duplex. Comes $7{\cdot}8^{ae}$ magnitudinis 0·6″ præcedit paulisper ad austrum," which is not quite in the usual order of these matters.

[Webb suggests that the mags. of both components are rather under-rated.]

Taurus Poniatowskii is a small asterism placed in the heavens, in 1777, by the Abbé Poczobut, of Wilna, in honour of Stanislaus Poniatowski, king of Poland; a formal permission to that effect having been obtained from the French Academy. It is between the shoulder of Ophiuchus and the Eagle, where some stars form the letter V, and from a fancied resemblance to the zodiac-bull and the Hyades, became another Taurus. Poczobut was content with 7 component stars, but Bode has scraped together no fewer than 80.

1223. 3729 h. SAGITTARII. (H. 4376.)

		h.	m.	s.		s.
R. A.		18	0	36	Prec. +	3·64
		°	′			″
Decl.	S	23	14·0		—— N	0·05

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; v Ri;" which means:—"a cluster; very large; very rich."

1224. 2278 Σ. DRACONIS.

		h.	m.	s.		s.
R. A.		18	0	58	Prec. +	1·06
		°	′			″
Decl.	N	56	26·0		—— N	0·08

		Position.		Distance.		Epoch.
		°		″		
Struve, W.	A B	22·5	...	38·9	...	1831·56
	B C	147·8	...	5·9		
Dunér	A B	23·7	...	38·1	...	1869·41
	A C	147·6	...	5·9		

A triple star. A 7½, white; B 8, white; C 8½. The constituents are evidently fixed. Closely *sf* *ξ* Draconis.

1225. 3731 h. SAGITTARII. (H. 4382.)

		h.	m.	s.			s.
R. A.		18	3	9	Prec.	+	3·90
		°	′				″
Decl.	S	31	46·7		——	N	0·28

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864 :—"⊕; p B; p L; R; glb M; rrr; st 16;" which means:—"a globular cluster; pretty bright; pretty large; round; gradually less bright in the middle; well resolved—clearly seen to consist of stars, which are chiefly of the 16th magnitude."

1226. 100 HERCULIS. (Σ. 2280.) DCXXXVI.

		h.	m.	s.			s.
R. A.		18	3	24	Prec.	+	2·41
		°	′				″
Decl.	N	26	4·8		——	N	0·30

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	1·6	...	11·7	...	1781·78
Struve, W.	2·9	...	13·8	...	1831·72
Smyth	2·8	...	14·1	...	1836·52
Wilson, &c.	182·6	...	14·0	...	1873·52
Jedrzejewicz	183·3	...	14·1	...	1880·65

A neat double star, S. of the hero's right hand, where some place the bunch of snakes. A and B, both 7, and both pale white, the preceding star being made the primary. Erroneously designated by H. as 43 Herculis.

This object lies in a pretty open space midway between *α* Lyræ and *β* Ophiuchi; and it is 11° from *β* Lyræ, on the line towards *α* Herculis.

1227. 73 OPHIUCHI. (Σ. 2281.) DCXXXVII.

		h.	m.	s.			s.
R. A.		18	4	6	Prec.	+	2·98
		°	′				″
Decl.	N	3	58·4		——	N	0·36

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	259·7	...	1·54	...	1831·05
Smyth	255·0	...	1·4	...	1842·39
Fletcher	256·2	...	1·5	...	1851·37
Mädler	252·8	...	1·17	...	1861·89
Dunér	253·9	...	0·92	...	1871·07
Doberck	250·0	...	1·03	...	1876·61

A close double star, in the space between the left shoulder of Ophiuchus and the Serpent's tail; and 6½° nearly E. of *β* Ophiuchi. A 6, silvery white; B 7½, pale white; and the 2 point nearly upon a dusky telescopic star in the *sp* quadrant. It certainly must have opened since H.'s epoch (1783), for I see it plainly under very moderate magnifying powers.

[The observations are not very accordant, but there is evidently a diminution in both angle and distance.]

1228. 54 H. VIII. SAGITTARII. (h. 1997; H. 4385.)

	h.	m.	s.		s.
R. A.	18	4	9	Prec. +	3·47
		°	′		″
Decl.	S	16	48·8	—— N	0·37

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl: L; l C; st e L;" which means:—"a cluster; large; not much compressed; the component stars are somewhat large."

1229. 417 B. HERCULIS. (Σ. 2289.)

	h.	m.	s.		s.
R. A.	18	5	14	Prec. +	2·68
		°	′		″
Decl.	N	16	27·3	—— N	0·46

	Position.		Distance.		Epoch.
			″		
STRUVE, W.	243·1	...	1·20	...	1829·96
MÄDLER	239·1	...	0·95	...	1843·49
DEMBOWSKI	234·3	...	1·24	...	1862·95
JEDRZEJEWICZ	233·4	...	1·19	...	1880·66

A double star. A 6, yellow; B 7½, bluish. A decrease of angle is certain.

1230. 30 H. VII. SAGITTARII. (h. 1998, 3735; H. 4388.)

DCXXXVIII.

	h.	m.	s.		s.
R. A.	18	6	8	Prec. +	3·60
		°	′		″
Decl.	S	21	35·8	—— N	0·54

A large and coarse cluster of minute stars, principally from 10th to 13th magnitudes, close to the upper end of the Archer's bow, and in the Galaxy. It forms a rich field, but without any disposition to particular form. One bright yellow star has a surrounding galaxy, somewhat more clustered than the other portions.

1231. 6 Σ. N. TAURI PONIATOWSKII. DCXL.

(h. 2000; H. 4390; ℌ.)

	h.	m.	s.			s.
R. A.	18	6	46	Prec.	+	2·91
		°	′			″
Decl.	N	6	49·6	——	N	0·59

A fine planetary nebula, in a rich vicinity, on the shoulder of the Polish bull; with many telescopic stars in the field. It is small but very bright, and was thought by W. Struve, its discoverer, to be one of the most curious objects in the heavens. Sir J. Herschel, who gave it a careful scrutiny, considered it as "something between a planetary nebula and a bright round nebula." It lies 7° from β Ophiuchi in the direction of the Dolphin's *lucida*, that is, about E. by N. [Diameter, according to D'Arrest, 7·05″. Engraved, Secchi, *Descrizione Osserv. Coll. Rom.*, Pl. iv. Fig. 3.]

1232. μ¹ SAGITTARII. DCXXXIX.

	h.	m.	s.			s.
R. A.	18	7	10	Prec.	+	3·58
		°	′			″
Decl.	S	21	5·2	——	N	0·62

		Position.		Distance.		Epoch.
		°		″		
Burnham	A B	258·4	...	16·7	...	1879·0
	A C	118·7	...	25·2		
	A D	312·1	...	48·3		
	A E	115·4	...	50·1		

A multiple star on the N. end of the Archer's bow. A 3½, pale yellow; B 16; C very faint; D 9½; E 10. This fine object, of which D and E point to a coarse double star in the *np* quadrant, may be found by the out-door gazer about 25° to the E.N.E. of Antares, where it is crossed by a line dropped into the S., from α Ophiuchi through β. It was described by ℌ. as "treble;" but Sir J. Herschel, by the discovery of the minute point of light, B, made it quadruple. [The extremely faint star C, between the principal star and one of Herschel's distant companions, was first noted by Burnham with the 26in Washington Refractor. That observer says that "all the other stars are very plain with a small aperture."]

Τοξότης, Sagittifer, Sagittipotens, Sagittarius, or Arcitenens, is the ninth of the zodiacal and the third of the southern signs; and it is well marked by 8 stars, which form two quadrangles resembling each other, four being in the Milky Way, and four of them out of it. In the days of Eratosthenes this asterism was figured as a satyr; and so it appears on the Farnese Globe. Manilius describes the *mixtus equo* with a look "scowling and threatening as Hannibal's when commencing the battles of Trebia, Thrasymene, and Cannæ." It is now usually figured in the form of that imaginary animal called the centaur, with a bow drawn to the full extent, as if in the act of shooting off an arrow; and this, we are taught, is to personify Chiron the schoolmaster, or Crotus the huntsman. Novidius asserts that the figure originally represented Joash, the son of Ahaziah, shooting off the arrows of Elisha; "but," observes Hood, "let them believe it that will."

These *niaiseries* are merely here resuscitated to advance the ends of justice; for the meagre mythological story of this creature may be placed among the many proofs before us that the Greeks could not have been the first to give names to the constellations. And there are vestiges of other constellations on this spot. Sir William Jones traced the Hindú zodiac to have existed more than 3000y ago, when the Sun entered Aswin; and among the early Orientals the stars γ, ϵ, δ, ζ, ϕ, τ, σ, ν, o, ξ and π constituted the fan of lions' tails, which, according to the *Brahmáṇda Paráan,* was flirted by Múla, the wife of Chandra. Then, again, the Arabians had once very different figures from the classical ones.

According to the renowned astrologian doctor, Arcandum, whose book, printed in 1542, is "ryghte pleasaunte to reade," a man born in Sagittarius is to be thrice wedded, to be very fond of vegetables, to become a matchless tailor, and to have three special illnesses; but as the last attack of sickness is to befall the patient at eighty years of age, it is not of paramount moment. Such was the *science* in which potentates delighted! Well might "Veritas in profundo" be the astrologer's motto.

A line from the head of Andromeda, carried over a Pegasi, points on the N. to Perseus, and on the S. through Capricorn to the Archer; the which, as Sherburne archly tells us, *aims* at the meridian at midnight about the end of June, "two months after the Centaur has *galloped* over it." The galley-rhymester has given a general rule for picking up the constellation on a fine night:

From Deneb in the stately Swan describe a line south-west,
Through bright Altair in Aquila 'twill strike the Archer's breast.

Sagittarius seems to have been much attended to on its enrolment among the old 48 constellations, and the number of its components has thus varied:—

Ptolemy	31 stars.	Hevelius	26 stars.
Tycho Brahé . .	16 „	Flamsteed . . .	69 „
Halley	21 „	Bode	339 „

1233. δ URSÆ MINORIS. DCLIII.

R. A.	18h 7m 48s	Prec. —	19s·41
Decl.	N 86° 36′·7	—— N	0″·68

	Position.	Difference of R. A.	Epoch.
Smyth	149°	53s	1834·74

A *Nautical Almanac* star with a very distant telescopic companion, in the middle of the Lesser Bear's tail. A 3, greenish tinge; B 12, grey; and a minute star in the *np* quadrant. This star has an extraordinary movement in consequence of its situation so near the Pole, and the earlier observations are not sufficiently accurate to build upon. The declination seems steady enough; but Piazzi lumps all the motions in R.A. together, and gives as "motus proprius annuus in arcu" a quantity = − 284·68″; while Baily assigns the value of its proper motions only, on the following scale:

R. A. + 0·47″; Decl. + 0·02″.

Flamsteed, in whose day it followed ν Aquilæ to the meridian, seems to have observed it only once, viz. on June 3, 1691; "and then," says Baily, "at the special request of Sir Christopher Wren."

It shares the somewhat unmerited honour of daily duty with Polaris, in the computations of the *Nautical Almanac.*

1234. 40 DRACONIS. (Σ. 2308.) DCXLVI.

R. A.	18h 8m 16s	Prec. —	4s·48
Decl.	N 79° 59′·0	—— N	0″·73

	Position.	Distance.	Epoch.
Herschel, J., and South	235°·1	21″·3	1822·29
Smyth	235·3	19·9	1839·81
Dunér	234·2	20·3	1869·57
Jedrzejewicz	234·4	20·1	1877·26

A fine double star, in the neutral ground between the left foot of Cepheus and the Lesser Bear's flank, whence it not unfrequently appears as 40 Cephei *vel* Draconis. A 5½, and B 6, both white. B ["Pale yellow."—*Knott*] is Flamsteed's 41.

A confusion in the *British Catalogue* has created the suspicion of a great proper motion in one of these stars, since Flamsteed's time; but the various measures disprove its existence. The question has been satisfactorily settled by Baily, who says, that the R.A. of 40 Draconis was deduced by Flamsteed from that of 28 Draconis, and would require to be increased 6′ 16·2″ in order to correspond with Bradley's observations. It is to be found at nearly one-quarter of the distance from Polaris to γ Draconis, to the S.E. of ε Ursæ Minoris.

1235. 376 Dunlop TELESCOPII. (h. 3737; H. 4393.)

		h.	m.	s.			s.
R. A.		18	9	49	Prec.	+	4·80
		°	′				″
Decl.	S	52	14·8		——	N	0·86

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; c B; c L; R; gmb M; rrr; st 15;" which means:—"a globular cluster; considerably bright; considerably large; round; gradually much brighter in the middle; well resolved—clearly seen to consist of stars which are chiefly of the 15th magnitude."

1236. η SAGITTARII.

		h.	m.	s.			s.
R. A.		18	10	11	Prec.	+	4·04
		°	′				″
Decl.	S	36	47·8		——	N	0·99

		Position.	Distance.	Epoch.
		°	″	
BURNHAM	A B	100·0	2·8	1879·66
	A C	302·1	94·3	

A double star, with a distant companion. A 3; B 11; C 10½. The duplicity of A was discovered by Burnham when at Mount Hamilton, in California.

1237. 2002 h. CLYPEI SOBIESKII. (H. 4395.) DCXLI.

		h.	m.	s.			s.
R. A.		18	10	34	Prec.	+	3·55
		°	′				″
Decl.	S	19	54·8		——	N	0·93

	Position.	Distance.	Epoch.
	°	″	
SMYTH	250	20	1836·55
BURNHAM	252·9	20·1	1879·37

A telescopic double star, in Sobieski's shield, preceding a loose but bright group in the *nf* quadrant. A 8½, and B 10, both grey. This object is described by its discoverer, Sir J. Herschel, as being placed in a faint nebula, and he has so figured it; but to my instrument the stars have only a glow, and some gleamy points of light around them. The nebulosity is represented as being elliptical, and 50″ in diameter.

Having found μ Sagittarii by the alignment already given, this object must be sought at the distance of 1½° to the N.E.; it is close upon 26 P. XVIII.

[Engraved, *Phil. Trans.*, 1833, Pl. ii. Fig. 30.]

1238. 24 M. CLYPEI SOBIESKII. (h. 2004; H. 4397.)

DCXLII.

		h.	m.	s.			s.
R. A.		**18**	**11**	**44**	Prec.	+	3·51
		°	′				″
Decl.	**S**	**18**	**26·8**		——	N	1·03

A beautiful field of stars, below the sinister base of the Polish shield, and in a richly clustering portion of the Milky Way. This object was discovered by Messier in 1764, and described as a mass of stars—a great nebulosity of which the light is divided into several parts. This was probably owing to want of power in the instrument used, as the whole is fairly resolveable, though there is a gathering spot with much star dust. A double star, H. and S. 264, follows in the *sf* quadrant, and a wider one *sp*, which is their No. 263; these must be the objects alluded to by Piazzi, Nota 25, Hora XVIII., "Quatuor sequuntur ad austrum, quorum una duplex." A line led from α Aquilæ to the S.W. over λ Antinoi, and continued as far again, reaches 24 M.

[2½° N. of μ Sagittarii. "A superb field of small stars."—*Brodie.*]

1239. 16 M. CLYPEI SOBIESKII. (h. 2006; H. 4400.)

DCXLIII.

		h.	m.	s.			s.
R. A.		**18**	**12**	**34**	Prec.	+	3·40
		°	′				″
Decl.	**S**	**13**	**49·7**		——	N	1·10

A scattered but fine large stellar cluster, on the nombril of Sobieski's shield, in the Galaxy, discovered by Messier in 1764, and registered as a mass of small stars in the midst of a faint light. As the stars are disposed in numerous pairs among the evanescent points of more minute components, it forms a very pretty object in a telescope of tolerable capacity. Its mean apparent place was obtained by differentiation with the equatoreal [a] instrument upon μ Sagittarii, from which it lies N. half

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[a] Though I have written equatoreal as a difference between the instrument and its equatorial relations, I have only custom to plead in justification. Thus the rare tract which Ramsden printed in 1774 is intituled, *A Description of a new universal Equatoreal.* A copy of this is preserved in the British Museum, in the *Opuscula Philosophica.* [This distinction in spelling is not now generally recognised, for the *i* is almost universal.]

E., at 7° distance; where it is on the line produced between θ Ophiuchi and δ Aquilæ, which also reached α Aquilæ.

1240. 18 M. CLYPEI SOBIESKII. (h. 2007; H. 4401.)

DCXLIV.

		h.	m.	s.			s.
R. A.		18	13	30	Prec.	+	3·48
			°	′			″
Decl.	S		17	10·8	——	N	1·19

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	133·0	...	24·8	...	1879·40

A neat double star, in a long and straggling assemblage of stars, below the Polish shield. A 9, and B 11, both bluish. This cluster was discovered by Messier in 1764, and registered as a mass of small stars appearing like a nebula in a $3\frac{1}{2}^{ft}$ telescope; which affords another instance that the means of that very zealous observer did not quadrate with his diligence. The whole vicinity is, however, very rich, and there are several splendid fields about a degree to the S. of this object. It lies 4° N. by E. of μ Sagittarii, in the direction of ϵ in the Eagle's tail.

1241. 15 B. CLYPEI SOBIESKII. (Σ. 2303.)

		h.	m.	s.			s.
R. A.		18	14	6	Prec.	+	3·26
			°	′			″
Decl.	S		8	1·9	——	N	1·23

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	216·4	...	3·22	...	1831·20
MÄDLER	220·6	...	3·52	...	1843·64
SECCHI	222·1	...	2·79	...	1857·59
CINCINNATI OBS.	222·4	...	2·79	...	1877·51
STONE, O.	222·7	...	3·00	...	1879·00

A double star. A 7, yellowish; B 10.

1242. 17 M. CLYPEI SOBIESKII. (h. 2008; H. 4403; ℜ.)

DCXLV.

		h.	m.	s.			s.
R. A.		18	14	16	Prec.	+	3·46
			°	′			″
Decl.	S		16	14·9	——	N	1·24

The horse-shoe, or Greek-*omega* Ω, nebula, just below Sobieski's shield; discovered by Messier in 1764, and registered as a train of light without stars, about 5′ or 6′ in extent. It bears from μ Sagittarii N. by E., about 5° distant, in the line towards ε Aquilæ. In my telescope, charged with a moderate eye-piece, this curious nebula is well seen, though not to the extent of convolution figured by Sir John Herschel. A magnificent, arched, and irresolveable luminosity occupies more than one third of the area, in a splendid group of stars, among which are Nos. 38 and 43 Piazzi XVIII.; they are principally from the 9th to the 12th magnitudes, reaching more or less all over the field.

In describing this object, Sir W. Herschel tells us that it is "a wonderful extensive nebulosity of the milky kind. There are several stars visible in it, but they can have no connection with that nebulosity, and are, doubtless, belonging to our own system scattered before it." It was also rigidly examined by his son, who says, "The chief peculiarities which I have observed in it are, first, the resolveable knot in the following portion of the bright branch, which is in a considerable degree insulated from the surrounding nebula, strongly suggesting the idea of an absorption of the nebulous matter; and secondly, the much smaller and feebler knot at the *np* end of the same branch, where the nebula makes a sudden bend at an acute angle."

This vicinity, as must have been already inferred, is particularly rich in clustering portions of the Milky Way. Indeed, the wonderful quantity of suns profusely scattered about here would be confounding, but for their increasing our reverence of the Omnipotent Creator, by revealing to us the immensity of the creation. Space, the grand theatre of astronomical meditation, is here illimitable; and so great is the number of stars in some parts of this Via Lactea, that H. observed 588 of them in his telescope at the same time; and they continued equally numerous for a quarter of an hour. In a space about 10° long, and 2½° wide, he computed that there were no fewer that 258,000 stars. Carrying this view into adjoining regions, words and figures necessarily fail, for the powers of mind falter in such vast and awful conceptions.

Warmed with the magnificence and boundless nature of his theme, Recorde writes thus:—

> "When Scipio behelde out of the high heavens the smallnes of the earth with the kingdomes in it, he coulde no lesse but esteeme the travaile of men most vaine, which sustaine soe muche grief with infinite daungers to get so small a corner of that lyttle balle,—so that it yrked him (as he then declared) to considere the smalnes of that their kingdome, whiche men so muche did magnifie. Whosoever therefore (by Scipion's good admonishment) doth minde to avoide the name of vanitie, and wyshe to attayne the name of a man, lette him contemne those trifelinge triumphes, and little esteeme that little lumpe of claye: but rather looke upwarde to the heavens, as nature hath taught him, and not like a beaste go poringe on the grounde, and like a scathen swine runne rootinge in the earthe."

Ovid had, however, been before him in appreciating the distinctive faculty of man, in the beautiful lines:

> Pronaque cum spectent animalia cætera terram;
> Os homini sublime dedit, cœlumque tueri
> Jussit, et erectos ad sidera tollere vultus.

But the efforts of Sir W. Herschel upon that astral feature, the Galaxy, must ever command admiration, and will speak through successive ages to the advantage of science, in a silent but undying tongue. In 1784, having made some skilful guages, he remarks: "By these observations it appears that the utmost stretch of the space-penetrating power of the 20^{ft} telescope could not fathom the profundity of the Milky Way, and that the stars which were beyond its reach must have been further from us than the 900th order of distances. . . . From the great diameter of the mirror of the 40^{ft} telescope we have reason to believe that a review of the Milky Way with this instrument would carry the extent of this brilliant arrangement of stars as far into space as its penetrating power could reach, which would be to the 2300th order of distances, and that it would then probably leave us again in the same uncertainty as the 20^{ft} telescope." Such is the wondrous arrangement of the celestial bodies in space! Suns upon suns, scattered over the regions of immensity, which stretch towards infinity on every side; yet by the fiat of the UNFATHOMABLE ETERNAL, all is properly arranged and compensated for, so as to ensure unbroken harmony and stability, amid the apparent complexities of the action of an ever-evolving and transmuting cause.

> The radiant orbs
> That more than deck, that animate the sky,
> Are life-infusing suns of other worlds.

[Engraved, *Phil. Trans.*, 1833, Pl. iv. Fig. 35; *Cape Obs.*, Pl. ii. Fig. 1; Lamont, *Nebelflecken*, Pl. i. Fig. 10; Mason, *Trans. Amer. Acad.*, vol. vii. Pl. vi. Fig. 1; Lassell, *Mem. R. A. S.*, vol. xxxvi. Pl. ii. Fig. 33; Rosse, *Dublin Trans.*, 1880, Pl. vi. Fig. 4403, (1 and 2.)]

1243. 50 H. I. SAGITTARII. (h. 3742; H. 4404.)

	h.	m.	s.		s.
R. A.	18	16	37	Prec. +	3·85
	°	′			″
Decl.	S 30	24·7		—— N	1·46

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:— "⊕; v B; p L; R; rrr; st 16;" which means:—"a globular cluster; very bright; pretty large; round; well resolved—clearly seen to consist of stars; which are chiefly of the 16th magnitude." Follows δ Sagittarii, a star of mag. $3\frac{1}{2}$, by 2^{m} 40^{s}, and 32′ to the S.

1244. 6385 Brisb. TELESCOPII. (*h. 5041.)

R. A.	18h 16m 54s	Prec.	+ 4·90s
Decl.	S 53° 41′·7	——	N 1″·48

	Position.	Distance.	Epoch.
Herschel, J.	260°·5	2″ *est.*	1837·40

A double star. A 7½; B 9.

1245. 28 M. SAGITTARII. (h. 2010, 3743; H. 4406.)

DCXLVIII.

R. A.	18h 17m 45s	Prec.	+ 3·69s
Decl.	S 24° 55′·7	——	N 1″·56

A compact globular cluster of very minute stars, between the Archer's head and his bow. It is not very bright; and is preceded by two telescopic stars in a vertical line. Messier describes it as a nebula without a star, and seen with difficulty in his $3\frac{1}{2}^{\text{ft}}$ telescope. But Sir W. Herschel resolved it, and placed it among the stellar clusters: his son has recommended it as a testing-object for trying the space-penetrating powers of telescopes. It lies about 1° *np* λ.

1246. φ DRACONIS. (O. Σ. 353.)

R. A.	18h 18m 1s	Prec.	− 0·85s
Decl.	N 71° 16′·7	——	N 1″·58

	Position.	Distance.	Epoch.
Struve, O.	63°·6	0″·56	1856·13
Dembowski	62·9	*not given*	1867·73
Burnham	55·7	0·47	1880·26

A close double star. A 5; B 7.

Burnham makes the R. A. = 18^{h} 22^{m} 20^{s} for 1890, and says that this is probably a binary.

1247. 59 SERPENTIS. (Σ. 2316.) DCXLIX.

R. A.	18h 21m 35s	Prec.	+ 3·07s
Decl.	N 0° 7′·7	——	N 1″·88

	Position.	Distance.	Epoch.
Struve, W.	314°·0	3″·9	1828·62
Smyth	314·2	3·9	1842·53
Secchi	317·6	3·8	1857·89
Gledhill	315·6	3·6	1874·80

A very neat double star, in the Serpent's tail. A 5½, yellow; B 8, indigo blue. Sir W. Herschel thought the position angle had diminished and that there was an increase of distance, but recent observations controvert these conjectures; and a comparison of the principal results, albeit they are not quite so coincident as might be expected, will stamp the relative fixity of the components.

To identify 59 Serpentis let an E.S.E. ray be shot from β Herculis through α, which will be found to lie two-fifths of the way towards 59. It is closely followed by the little star, 77 P. XVIII.

1248. 39 DRACONIS. (Σ. 2323: 36 App. I.) DCL.

R. A.	**18h. 22m. 20s.**	Prec.	+ 0s·88
Decl.	**N 58° 44′·1**	——	N 1″·95

		Position.	Distance.	Epoch.
Herschel, W.	A B	12°·8	2″·5 ±	1780·78
	A C	26·6	*not given*	
Smyth	A B	5·5	3·3	1836·39
	A C	21·7	89·2	
Nobile	A B	0·5	3·8	1876·80
	A C	21·5	90·5	
	B C	22·4	86·8	
Jedrzejewicz	A C	21·5	89·5	1878·95

A triple star in the first inflection of the monster's neck, and lying in mid-distance between γ and δ Draconis. A 5, pale white; B $8\frac{1}{2}$, light blue; C 7, ruddy. Its suspected retrograde angular motion seems confirmed.

[Nobile's measures are borrowed from Gledhill, but owing to the foolish practice in Gledhill's book of suppressing certain figures I do not know whether Nobile's angle for AB means 0·5° or 350·5°.]

1249. 4415 H. DRACONIS.

R. A.	**18h. 22m. 44s.**	Prec.	− 1s·72
Decl.	**N 74° 31′·2**	——	N 1″·98

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864 :—"!!; p B; p L; E 50°; 2 st p *Var* (Tuttle);" which means :—"a very remarkable object; pretty bright; pretty large; extended in the direction of 50° with the meridian; 2 stars precede it; this is the nebula thought by Tuttle to be variable." Writing to Sir J. Herschel under date of May 8, 1863, D'Arrest said :—"La nebuleuse de M. Tuttle était, le 24 Sept. 1862, si brillante, et si remarquable dans le chercheur (*grandis et præclara, ovalis, 2′ longa, 80″ lata*) que je me suis persuadé qu'elle n'a pas été telle du temps de Messier et de votre père, et de vos propres observations."

1250. 51 ♅. I. SAGITTARII. (h. 3748; H. 4412.)

		h.	m.	s.		s.
R. A.		18	24	8	Prec. +	3·71
		°	′			″
Decl.	S	25	33·9		—— N	2·11

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; S; R; rr;" which means:—"a globular cluster; bright; small; round; partially resolved; some stars visible."

1251. 69 M. SAGITTARII. (H. 4411.)

		h.	m.	s.		s.
R. A.		18	24	10	Prec. +	3·91
		°	′			″
Decl.	S	32	25·5		—— N	2·11

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; L; R; rrr; st 14 . . . 16;" which means:—"a globular cluster; bright; large; round; well resolved—clearly seen to consist of stars; which range chiefly from the 14th to the 16th magnitudes."

1252. 25 M. SAGITTARII. DCLI.

		h.	m.	s.		s.
R. A.		18	25	10	Prec. +	3·53
		°	′			″
Decl.	S	19	8·5		—— N	2·20

A loose cluster of large and small stars in the Galaxy, between the Archer's head and Sobieski's shield. The gathering portion of the group assumes an arched form, and is thickly strewn in the S., or upper part, where a pretty knot of minute glimmerers occupies the centre, with much star-dust around. It was discovered in 1764 by Messier, and estimated by him at 10′ in extent: it is 5° to the N.E. of μ Sagittarii, and nearly on the parallel of β Scorpii, which glimmers far away in the W.

[This cluster has escaped inclusion in Sir J. Herschel's *Catalogue* of 1864. Burnham has recorded pairs of stars as follows:—

B. A. C. 6301 Pos. 252°; Dist. 66·6″; Epoch 1879·34; Mags. 7, 9.
In the field *sp* Pos. 175; Dist. 10±; Epoch 1879·34; Mags. 9, 9.
In the field *np* Pos. 301; Dist. 30·9; Epoch 1879·34; Mags. 9, 9½.

Star B of the first-named pair has been found by Burnham to be itself a close double. Pos. 120°; Dist. 0·6″; Epoch, 1880·59; Mags. 9 and 10. The second of these has been observed by O. Stone, who gives:—Pos. 173°; Dist. 10·9″; Epoch 1879·38; Mags. 8 and 8½.]

1253. 29 B. CLYPEI SOBIESKII. (Σ. 2325.)

R. A.	18h 25m 20s	Prec. + 3s·33
Decl.	S 10° 51′·9	—— N 2″·21

	Position.	Distance.	Epoch.
Struve, W.	257°·9	12″·3	1829·58
Stone, O.	257·2	12·6	1878·62

A double star. A 6, white; B 10.

1254. κ CORONÆ AUSTRALIS.

R. A.	18h 25m 47s	Prec. + 4s·14
Decl.	S 38° 47′·8	—— N 2″·25

	Position.	Distance.	Epoch.
Herschel, J.	359°·3	21″·8	1836·71

A double star. A 6½; B 7½.

1255. 23 H. VI. SAGITTARII. (h. 2013; H. 4416.)

R. A.	18h 26m 15s	Prec. + 3s·48
Decl.	S 17° 57′·9	—— N 2″·29

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; v Ri; p C; st 11 … 15;" which means:—"a cluster; pretty large; very rich; pretty compressed; the component stars range from the 11th to the 15th magnitudes."

1256. 607 Dunlop SAGITTARII. (h. 3752; H. 4421.)

R. A.	18h 28m 30s	Prec. + 3s·94
Decl.	S 33° 3′·9	—— N 2″·49

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; l E; rrr; st 15;" which means:—"bright; small; little extended; well resolved—clearly seen to consist of stars; which are chiefly of the 15th magnitude."

1257. 22 M. SAGITTARII. (h. 2015, 3753; H. 4424.) DCLIV.

R. A.	18h 29m 28s	Prec. + 3s·66
Decl.	S 23° 59′·4	—— N 2″·57

A fine globular cluster, outlying that astral stream, the Via Lactea, in the space between the Archer's head and bow, not far from the point of the winter solstice, and midway between μ and σ Sagittarii. It consists of very minute and thickly condensed particles of light, with a group of small stars preceding by 3^{m}, somewhat in a crucial form. Halley ascribes the discovery of this in 1665, to Abraham Ihle, the German; but it has been thought this name should have been Abraham Hill, who was one of the first council of the Royal Society, and was wont to dabble with astronomy. Hevelius, however, appears to have noticed it previous to 1665, so that neither Ihle nor Hill can be supported.

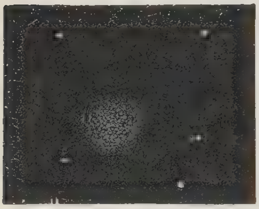

FIG. 39. 22 M. SAGITTARII.

In August, 1747, it was carefully drawn by Le Gentil, as seen with an 18^{ft} telescope, which drawing appears in the *Mémoires de l'Académie* for 1759. In this figure three stars accompany the cluster, and he remarks that two years afterwards he did not see the preceding and central one: I, however, saw it very plainly in 1835. In the description he says, "Elle m'a toujours parue tres-irrégulière dans sa figure, chevelue, et repandant des espèces de rayons de lumière tout autour de son diamètre." This passage I quote, "as in duty bound;" but from familiarity with the object itself, I cannot say that I clearly understand how or why his telescope exhibited these "espèces de rayons." Messier says nothing about them, merely observing that it is a nebula without a star, of a round form; and Sir W. Herschel, who first resolved it, merely describes it as a circular cluster, with an estimated profundity of the 344th order. Sir J. Herschel recommended it as a capital test for trying the space-penetrating power of a telescope.

This object is a fine specimen of the compression on which the nebular theory is built. The globular systems of stars appear thicker in the middle than they would do if these stars were all at equal distances from each other; they must, therefore, be condensed towards the centre. That the stars should be thus accidentally disposed is too improbable a supposition to be admitted; whence Sir W. Herschel supposed that they are thus brought together by their mutual attractions, and that the gradual condensation towards the centre must be received as proof of a central power of such a kind.

1258. 55 TAURI PONIATOWSKII. (Σ. 2342.)

R. A.	18h. 30m. 11s.	Prec.	+ 2·96s.
Decl.	N 4° 53′·5	——	N 2″·64

	Position.	Distance.	Epoch.
Struve, W.	12·0°	26·6″	1828·71
Struve	11·7	27·0	1832·81
Mädler	10·6	28·3	1845·46
Jedrzejewicz	9·1	28·7	1876.63

A double star. A 6, white; B 9. The above changes are due to proper motion.

1259. 12 H̥. VIII. AQUILÆ. (h. 3754; H. 4426.)

R. A.	18h. 30m. 43s.	Prec.	+ 3·27s.
Decl.	S 8° 18′·7	——	N 2″·68

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864 :—"Cl; L; p Ri; vl C;" which means :—"a cluster; large; pretty rich; very little condensed."

1260. 190 B. DRACONIS. (Σ. 2348.)

R. A.	18h. 31m. 26s.	Prec.	+ 1·36s.
Decl.	N 52° 15′·7	——	N 2″·74

	Position.	Distance.	Epoch.
Struve, W.	272·7°	25·7″	1832·02
Main	273·9	25·4	1865·38

A double star. A 6, very yellow; B 8½, very blue. Webb describes the colours as "very fine."

1261. α LYRÆ. (Σ. 9 App. II.) DCLV.

R. A.	18h. 33m. 13s.	Prec.	+ 2·03s.
Decl.	N 38° 40′·9	——	N 2″·89

	Position.	Distance.	Epoch.
Herschel, W.	116·2°	43·0″	1792·31
South	133·5	41·1	1825·56
Smyth	140·3	43·4	1843·34
Secchi	147·7	45·2	1857·47
Flammarion	155·1	48·1	1877·00

A *Nautical Almanac* star, with a little companion in the *sf*, on the preceding *yoke* of the Lyre. A 1, pale sapphire; B 11, smalt blue; a third star in the *np* quadrant, [discovered by Winnecke and very faint and difficult]: the whole preceded at a distance by a coarse triple star, on the same parallel of declination. [The rapid changes in angle and distance recorded above are not proofs of binarity, but are due to the considerable proper motion of A. The amount of this is, according to Brunnow, as follows:—In R.A. +0·24″; in Decl. +0·26″.]

α Lyræ is one of the insulated bodies, and is worthy of ranking with Sirius, Canopus, and Capella. Yet, by the experiments of Dr. Wollaston, it appeared that the light afforded us by this star is about $\frac{1}{180,000.000,000}$th part of the Sun's light, or only about $\frac{1}{9}$th part of the light of Sirius, but still it offers a glorious blaze. From its peculiar circumstances, it was selected by Dr. Brinkley for investigating the parallax, and after much toil he came to the conclusion, that the angle which the radius of the Earth's orbit subtends at that star is not less than 2″, nor much more than 2·52″. From this the distance of *α* Lyræ was estimated as being at least 400,000 times ninety-five millions of miles, or semi-diameters of our orbit. Piazzi also assigned it a similar value in parallax, and Calandrelli even more. To a measurement made by Sir W. Herschel, under a magnifying power of 6450, its diameter subtended an angle of 0·3553″. But the case was fraught with difficulties apparently insurmountable; for the parallaxes hitherto assigned become proportionally less as the means of observation improve. [This remark still seems to hold good.] Thus, after the closest and most skilful application to this star, Airy has pronounced that its annual parallax is too small to be sensible to our best instruments. W. Struve, finding this brilliant object the best adapted for his high northern station, observed it very closely during the apparitions of 4 successive years; of which the 17 days of July, 1836, by means of 34 equations on the least squares, yield a resulting parallax of 0·125″, subject to the probable error of 0·055″. These computations yield to *α* Lyræ the distance of one and a half million times our own distance from the Sun; while those of the Bishop of Cloyne estimate the same space only at 20 billions of miles. This brought forward Struve's ingenious analogy into the vastness of space, by which it is inferred that the stars of the 1st magnitude are, in general, about two millions of our solar distance from us; those of the 6th magnitude, 16 millions; those of the 8th magnitude, 60 millions; and those of the 12th or smallest visible in the Frauenhofer tube, 640 millions, or 60,800,000,000,000,000 of miles. This is a grand conception, of which the interest is not destroyed even by the subsequent splendid labours of Bessel, on 61 Cygni *.

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* This will in some measure recall Kepler's ingenious suggestion on the same point. He held that, on the surface of a sphere, there could be only 13

It is impossible to gaze on *a* Lyræ and its minute companion without recalling the Apostle's words, "one star differeth from another star in glory;" yet the little one bears illumination very fairly.

a Lyræ is called Wega in the Catalogues, from *Wáḳi'*, in the compound name of *al-nesr-al-wáki'*, the falling eagle; a part being put for the whole in the Alphonsine Tables. It is also termed Lucida Lyræ, and is greatly in favour with navigators; but not so much so as it is to be, for, from the effects of the periodic revolution of the celestial equinoctial pole around the pole of the ecliptic, it will be within 5° of the North Pole about $10{,}000^{y}$ hence, and will be gazed at as the polar gem of the northern hemisphere. Instead, therefore, of passing the meridian within a few degrees of the zenith, as it now does in these latitudes, it will then remain nearly stationary with respect to the horizon. In the mean time its present place is readily found by running a ray from *a* Boötis through *a* Coronæ Borealis, and this ray prolonged leads to the Swan. Wega, Arcturus, and Polaris form, very nearly, a large right-angled triangle. From the southward, a line from *a* Scorpii through *a* Ophiuchi, carried a similar distance beyond, leads upon Lyra; and the three well-known stars in the neck of Aquila point nearly upon it. To lisp it in numbers:

Altair in Aquila that flames, and Wega's lucid light,
To Rasalague westward join'd, form a triangle bright.
Of which the apex to the north, the Lyre pertains unto,
A truly noble point it forms, a gem of sapphire blue.

The Lyre is one of the old 48 constellations, and has been called Nablon, *Λύρα*, Cythara, Sulhafa, Testudo, Fides, Fidis, and Fidicula, from the Hebrew, Greek, Latin, and Arabic terms for a stringed instrument. But there is no end of its names. We are told, that the design originated from musical sounds struck out of the shell of a tortoise, which had become putrid during the inundation of the Nile, but the tenacious nature of intestines preserved them till the subsidence of the waters, when they dried into chromatic strings. Hence the ambiguous verse in the beautiful ode of Horace, wherein the mute fishes having the melodious voice of the swan was a sore puzzle, till Molyneux rubbed off the obscurity by thus explaining the matter:

O mutis quoque piscibus
  Donatura cycni, si libeat, sonum!

The predecessors of Ptolemy called this asterism *χέλυς*, from which

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points equally remote from each other and from the centre; and supposing the nearest fixed stars to be as distant from each other as they are from the Sun, he concludes that there are but thirteen stars of the 1st magnitude. At twice the distance from the Sun there may be 4 times as many, and so on.

the Italians made their *Sheliak*, from *Shelyâķ*, a name now improperly applied to β Lyræ. For ages it was simply delineated as a cithara. In the celebrated MS. of Cicero's *Aratus*, now in the British Museum, which is pronounced to be of the second or third century, there is a large coloured drawing of the truly classical lyre; but in after times, somebody or other thought proper to place it in the claws of a descending bird, ycleped Vultur cadens. The Arabs are blamed for this, but it does not appear on their Borgian and Dresden Globes, while their Al Nesr, which Hyde renders *Vulture*, really means the large stone-eagle. Ideler, on Kazwíní, rubs the transcribers of the Alphonsine Tables, and by the known cucumber-gerkin etymological process, converts the puzzling phrase, *pupilla deferens*, into *vultur cadens;* and from *vultur cadens* came our old Falling Grype. The constituents have been thus numbered:

Ptolemy . . .	10 stars.	Hevelius	17 stars.
Tycho Brahé .	11 ,,	Flamsteed . . .	21 ,,
Bayer	13 ,,	Bode	166 ,,

The elegant simplicity of form in the early Greek asterism, as contrasted with its modern successor, may be seen by any one who will compare the drawing above cited, or even that on the Farnese Globe, with the one which Hevelius produced 1000^{y} afterwards, where the awkward bird holds an instrument which neither in ancient nor modern times ever had existence.

1262. 151 P. XVIII. LYRÆ. (Σ. 2362.) DCLVI.

	h. m. s.		s.
R. A.	**18 34 32**	Prec. +	2·11
	° ′		″
Decl. N	**35 57·4**	—— N	3·01

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	180·2	...	3·9	...	1830·95
Smyth	180·2	...	3·8	...	1834·69
Dunér	181·9	...	4·1	...	1871·06

A very neat double star, on the preceding horn of the Lyre, and 3° to the S. of α. A 8, pale white; B 9, lilac; a distant telescopic companion in the following part of the field.

1263. 2017 h. AQUILÆ. (H. 4429.)

	h. m. s.		s.
R. A.	**18 35 45**	Prec. +	3·18
	° ′		″
Decl. S	**4 52·0**	—— N	3·10

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; L; Ri; st 10 . . . 18;" which means:—"a cluster; large; rich; the component stars range from the 10th to the 18th magnitudes."

1264. 70 M. SAGITTARII. (h. 3756; H. 4428.)

	h.	m.	s.		s.
R. A.	**18**	**36**	**2**	Prec. +	3·91
		°	′		″
Decl.	**S**	**32**	**23·7**	—— N	3·14

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; pL; R; gbM; st 14 . . . 17;" which means:—"a globular cluster; bright; pretty large; round; gradually brighter in the middle; the component stars range from the 14th to the 17th magnitudes."

1265. 2 AQUILÆ. DCLVII.

	h.	m.	s.		s.
R. A.	**18**	**36**	**15**	Prec. +	3·28
		°	′		″
Decl.	**S**	**9**	**9·5**	—— N	3·16

	Position.	Distance.	Epoch.
	°	″	
SMYTH	133·8	55	1831·58
BURNHAM	130·4	52·5	1879·37

A brightish star with a minute companion, in the space between Antinous and the Polish shield, 20° to the S.S.E. of β Ophiuchi, A 5, yellowish; B 11, purple; several minute stars in the field, which is in a condensed part of the Via Lactea. H̥. showed it to Dr. Watson, under very high magnifying powers, a practice which some hypercritics were then arraigning. Sir William, however, was not to be diverted from an object by groundless argument. "The naturalist," says he, "does not think himself obliged to account for all the phenomena he may observe; the astronomer and optician may claim the same privilege. When we increase the power we lessen the light in the inverse ratio of the square of the power; and telescopes will, in general, discover more small stars the more light they collect; yet, with a power of 227 I cannot see the small star near the star following o Aquilæ, when, by the same telescope, it appears very plainly with the power of 460: now, in the latter case, the power being more than double, the light is less than the fourth part of the former."

1266. 2018 h. AQUILÆ. (H. 4430.)

	h.	m.	s.		s.
R. A.	**18**	**36**	**17**	Prec. +	3·22
		°	′		″
Decl.	**S**	**6**	**19·6**	—— N	3·16

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; v Ri; vl C (in M. Way);" which means:—"a cluster; very rich; very little condensed; (in the Milky Way)."

1267. 3757 h. PAVONIS. (H. 4431.)

	h.	m.	s.			s.
R. A.	18	38	7	Prec.	+	5·94
		°	′			″
Decl.	S	65	17·7	——	N	3·32

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p L; R; vg, psvmb M; * 7 p;" which means:—"very bright; pretty large; round; at first very gradually, then pretty suddenly very much brighter in the middle; a 7th mag. star precedes."

1268. 2372 Σ. LYRÆ.

	h.	m.	s.			s.
R. A.	18	38	11	Prec.	+	2·16
		°	′			″
Decl.	N	34	38·2	——	N	3·32

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	84·2	...	25·1	...	1829·08
MAIN	83·9	...	24·7	...	1864·75
DUNÉR	83·4	...	24·9	...	1871·33

A double star. A 7, white; B 9, clear blue. 2° *np* *β*.

1269. 26 M. CLYPEI SOBIESKII. (h. 3758; H. 4432.)

DCLVIII.

	h.	m.	s.			s.
R. A.	18	39	11	Prec.	+	3·29
		°	′			″
Decl.	S	9	30·6	——	N	3·41

A small and coarse, but bright, cluster of stars, preceding the left foot of Antinous, in a fine condensed part of the Milky Way; it follows 2 Aquilæ by about ½°. The principal members of this group lie nearly in a vertical position with the equatorial line, and the place is that of a small pair in the south, or upper portion of the field. This neat double star is of the 9th and 10th magnitudes, with an angle = 48°, and it follows an 8th, the largest in the assemblage, by 4^{s}. Altogether the object is pretty, and must, from all analogy, possess affinity among its various components; but the collocations and adjustments of these wondrous firmamental clusters, and their probable distances, almost stun our present faculties. There are many astral splashes in this crowded district of the Galaxy, among which some fine specimens of what may be termed *luminiferous ether* are met with.

1270. 56 B. LYRÆ. (Σ. 2380.)

R. A. 18$^{h.}$ 39$^{m.}$ 41$^{s.}$ | Prec. + 1$^{s.}$·76
Decl. N 44° 49′·4 | —— N 3″·46

	Position.		Distance.		Epoch.
STRUVE, W.	10°·1	...	25″·8	...	1831·15
MAIN	10·4	...	26·3	...	1865·31

A double star. A 7, yellow; B 9, bluish white.

1271. 75 B. TAURI PONIATOWSKII. (Σ. 2375.)

R. A. 18$^{h.}$ 40$^{m.}$ 4$^{s.}$ | Prec. + 2$^{s.}$·95
Decl. N 5° 23′·4 | —— N 3″·48

	Position.		Distance.		Epoch.
STRUVE, W.	107°·8	...	2″·22	...	1825·60
DAWES	111·5	...	2·07	...	1848·56
SECCHI	111·6	...	2·23	...	1856·92
DUNÉR	114·6	...	1·85	...	1871·47
JEDRZEJEWICZ	115·3	...	2·25	...	1880·64

A double star. A 6½, white; B 7, white. Possibly the angle is increasing, but the measures of distance are not harmonious.

1272. T AQUILÆ.

R. A. 18$^{h.}$ 40$^{m.}$ 26$^{s.}$ | Prec. + 2$^{s.}$·87
Decl. N 8° 38′·1 | —— N 3″·52

A variable and coloured star discovered to be variable by Winnecke in 1860. Period about 4^{mth}; range, from about mag. 9 to mag. 9½. According to Schönfeld the period is uncertain and irregular. As regards its colour, Sir J. Herschel at the Cape noted it to be "ruddy purple;" Webb, 1873, "pale ruby."

1273. 46 DRACONIS.

R. A. 18$^{h.}$ 40$^{m.}$ 30$^{s.}$ | Prec. + 1$^{s.}$·16
Decl. N 55° 25′·7 | —— N 3″·52

A star with a companion at a distance of about 1½′ (Sir W. Herschel). A 5, full yellow; B 9, clear blue. These latter particulars are from Webb.

1274. ε LYRÆ. (Σ. 2382; 37 App. I.; 2383.) DCLXI.

	h. m. s.		s.
R. A.	18 40 41	Prec. +	1·98
Decl.	N 39 33·2	—— N	3·54

		Position.	Distance.	Epoch.
		°	″	
SMYTH	A B	23·9	3·2	1836·45
	A C	172·9	206·8	
	C D	154·6	2·5	
FLAMMARION	A C	172·8	207·1	1877·52

A double-double, or rather a multiple star, on the frame of the Lyre, and only 1½° to the N.E. of *a*. A 5, yellow; B 6½, ruddy; C (which is Flamsteed's 5 Lyræ), 5, and D 5½, both white. Between these pairs, and two-thirds over from ε towards 5, are three small stars forming a curve to the S., the two smallest being H.'s "debilissima" couple, of the 13th magnitude, having an angle=220°, and about 45″ apart. Another star has, I understand, been added to these by the Earl of Rosse's powerful telescope; but the annexed is the diagram as seen in my refractor, where A B are the lowest or northern pair, and C D the highest.

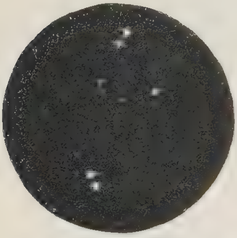

FIG. 40. ε LYRÆ.

The proper motions in space assigned to this quadruple related system form a link in the chain of evidence which proves the connexion; they are to these values:

ε Lyræ.	5 Lyræ.
B ... R.A. + 0·03″; Decl. + 0·07″	*B* ... R.A. + 0·03″; Decl. + 0·08″
A ... R.A. + 0·01″; Decl. + 0·07″	*A* ... R.A. + 0·22″; Decl. + 0·09″

and the following results will show the slow but certain change of the position angle of both the pairs, in a retrograde direction:

ε Lyræ, A B.

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	33·9	3·44	1779·83
HERSCHEL, J., and SOUTH	25·9	4·01	1822·12
STRUVE, O.	22·5	3·52	1840·74
MÄDLER	19·4	3·05	1861·35
DOBERCK	16·3	3·04	1878·56
JEDRZEJEWICZ	16·1	3·16	1879·74

5 Lyræ, C D.

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	173·5	3·50	1779·83
HERSCHEL, J., and SOUTH	159·9	3·80	1822·42
STRUVE, O.	151·1	2·73	1840·83
MÄDLER	145·2	2·62	1861·35
DOBERCK	139·1	2·24	1878·56
JEDRZEJEWICZ	138·1	2·58	1879·73

[The following measures (calculated, not observed) of the small stars between the 2 primary pairs will be useful for reference. E is of mag. 9½, and F and G both of mag. 13.

	Position.		Distance.		Epoch.
	A E.				
	°		″		
Wilson and Seabroke	134·7	...	144	...	1872·52
	A F.				
Wilson and Seabroke	180·5	...	139	...	1872·52
	A G.				
Wilson and Seabroke	167·5	...	108	...	1872·52]

This system forms a very elegant object, and merits the closest attention. The naked eye sees an irregular-looking star near α, which separates into two pretty wide ones under the slightest optical aid. Each of these two will be found to be a fine binary pair, and between the two sets are the minute acolytes above mentioned. They present a vast field for contemplation: ε and 5 resemble each other so closely in magnitude, distance, orbital retrogradation, and proper motions, as to afford palpable evidence of their forming a twin system; and a combined rotation about a common centre of gravity may be suspected. Though the resulting values of this retrocession vary, the absolute amount is not violently discordant when all the circumstances of the case are borne in mind; and they are unanimous in its *np sf* direction. Indeed, it may be roundly stated that B will revolve round A in about a couple of thousand years; C will take a similar circuit around D in perhaps half that time; and possibly both double systems may move about the central ones in something less than a million of years. But what is this duration when compared to that astounding unit of time, the *annus magnus* of the whole creation! Imagination is lost in the conjecture.

[W. Struve suspected variability in the stars C and D. Webb considers F and G to be good tests for a 4^{in} refractor. Much larger instruments reveal one or two other companions not mentioned above.]

1275. 5 AQUILÆ. (Σ. 2379.) DCLIX.

	h.	m.	s.			s.
R. A.	18	40	47	Prec.	+	3·09
	°	′				″
Decl.	S	1′	4·7	——	N	3·33

		Position.		Distance.		Epoch.
		°		″		
Herschel, W.	A B	121·6	...	11·9	...	1796·60
Struve, W.	A B	121·5	...	13·2	...	1832·45
Stone, O.	A B	120·2	...	13·1	...	1879·55
	A C	145·0	...	27·2		
	B C	155·6	...	22·5		

A delicate triple star, between the Serpent's tail and Antinous, in a wavy nook of the Eagle's boundary, which the map-makers have carried to 10° S.; whence this star sometimes appears as η Serpentis. A 7, white; B 8, lilac; C 14, blue. The object forms a curve into the *sf* quadrant, but C is so minute as to have escaped most observers except H., who, however, did not measure it, and its place is here merely estimated for finding. The former measures of A B, compared with mine, indicate permanence both in angle and distance.

5 Aquilæ is about 17° to the S.W. of Altair, in a line towards η Ophiuchi; and its place is indicated by a ray carried from α Coronæ Borealis through β and α Herculis.

1276. 110 HERCULIS. DCLX.

		h.	m.	s.		s.
R. A.		18	40	55	Prec. +	2·58
		°	′			″
Decl.	N	20	26·8		—— N	3·56

		Position.		Distance.		Epoch.
		°		″		
Burnham	A B	95·5	...	44·7	...	1879·30
	A C	92·3	...	61·0		

A delicate [triplet of stars], in the space over the Eagle's tail. A 5, pale yellow; B [14; C 12]. This object was among the tests sent to me by Sir J. Herschel, for trial; and though C was caught by gleams on steady gazing in a darkened field, it is certainly a *minimum visibile* of my telescope. The details of course are mere estimations, but carefully taken. It lies nearly midway between β Ophiuchi and β Cygni. It is also 18° S. ½ E. of Wega, and exactly halfway between β Herculis and α Delphini.

[Seen by Webb with 5½in refractor, 1862, and "pretty steady." B was first noticed by Burnham.]

1277. ζ LYRÆ. (Σ. 38 App. I.) DCLXII.

		h.	m.	s.		s.
R. A.		18	40	59	Prec. +	2·06
		°	′			″
Decl.	N	37	29·4		—— N	3·57

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	149·7	...	43·7	...	1835·20
Bellamy	149·3	...	44·4	...	1875·73
Jedrzejewicz	149·6	...	44·1	...	1878·22

A fine double star, at the bottom of the preceding horn of the Lyre, about 2° S. of ε; the two, with α Coronæ Borealis, form a neat triangle. A 5, topaz; B 5½, greenish.

Allowing for the components being charged with a small movement in space, the results of all the subsequent astrometers show the relative constancy of these stars.

Bianchini thought he saw the southern of the two stars double, at Verona, in 1735, through telescopes of great focal length by Campini and Cellius. Short also saw it surrounded by five small stars; and several other reports obtained. But they are dismissed by Sir J. Herschel, who observes, "Doubtless, in a part of the heavens so crowded with stars, numbers of minute stars may be seen near it in good telescopes; but the division of one of the large stars into two is a fact which we may be allowed to doubt." Among the *comites* most visible are three of the 11th and 12th magnitudes near the northern verge of the field, and two in the *sp* quadrant, of which the largest is of the 10th lustre. ζ Lyræ is readily found.

[Burnham has seen another companion. Pos. 275°; Dist. 43″; Epoch, 1880·50; Mag. 13.]

1278. 203 B. DRACONIS. (Σ. 2403.)

		h.	m.	s.			s.
R. A.		18	43	0	Prec.	+	0·71
Decl.	N	60°	55′·7		——	N	3″·75

	Position.	Distance.	Epoch.
Struve, W.	258°·7	1″·86	1832·21

A double star. A 6½, yellow; B 9½, blue.

1279. 197 P. XVIII. ANTINOI. DCLXIII.

		h.	m.	s.			s.
R. A.		18	43	47	Prec.	+	3·21
Decl.	S	6°	2′·3		——	N	3″·81

		Position.	Distance.	Epoch.
Burnham	A B	356°·8	22″·5	1879·37
	A C	170·6	113·8	

A triplet of stars, between the foot of Antinous and Sobieski's shield. A 7, orange tint; B [13; C 9]. There are many telescopic stars in the field; and in the *sp* quadrant are two open double stars, each trending *np* and *sf*, and about 35″ or 40″ apart. Of these one pair is very faint, and the preceding and brightest constitutes Σ. 2391. It is posited about 4° to the W. by S. of the bright star λ Antinoi, in one of the strange contortions termed *hooks* by Baily, and in which the map-makers have specially delighted in this vicinity.

In this constellation are the 4 fine stars, δ, λ, κ, and θ, which make a rhombus, all of which are marked γ, or 3rd magnitude: on the Borgian globes this quadrangle appears as *el-ḍhalímaïn*, the two ostriches. Tycho brought the Bithynian forward in the *Progymnasmata* as a separate constellation, and Hevelius followed him; but most astronomers lump his stars and those of the Eagle together. Thus Flamsteed omitted his figure on the 23rd plate of the great *Atlas*, whereon Aquila, Sagitta, Vulpecula, and Delphinus, are represented; but it appears in Bayer's *Uranometria*, 1603, and also on the neat plate in Kepler's *Stella Nova in pede Serpentarii*, &c., 1606. Schickard, the "Astroscopius," designates the asterism *Antinous*, sive *Ganymedes*; but Thomas Hood, speaking of the Bithynian name, indignantly exclaims, "but whereupon that name should come I know not, except it were that some man devised it there, to currie favour with the Emperor Adrian."

1280. 11 M. ANTINOI. (h. 2019; H. 4437; 𝕽.) DCLXIV.

	h.	m.	s.			s.
R.A.	18	45	13	Prec.	+	3·22
Decl.	S	6°	24′·1	——	N	3″·93

A splendid cluster of stars, closely to the E.S.E. of 197 P. XVIII. previously described: it precedes the left foot of Antinous, and is on the dexter chief of Sobieski's shield. This object, which somewhat resembles a flight of wild ducks in shape, is a gathering of minute stars, with a prominent 8th magnitude in the middle, and two following; but by all analogy these are decidedly between us and the cluster. This, however, was not the opinion of Kirch, its discoverer, who, in 1681, described it as a small obscure spot, with a star shining through, and rendering it more luminous. Derham first resolved it into stars, with his 8ft reflector, as shown in the *Philosophical Transactions*, 1733: "it is not," said he, "a *nebulose*, but a cluster of stars, somewhat like that which is in the Milky Way." *That* in the Milky Way!

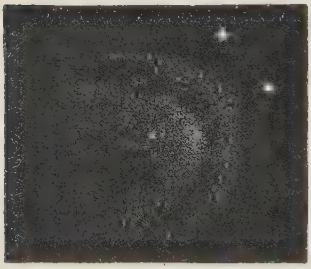

Fig. 41. 11 M. Antinoi.

Halley drew up a description of the nebular wonders, in 1716. They then amounted to 6; but he says, "there are undoubtedly more which have not yet come to our knowledge." He could little foresee the rich harvest which was soon to be reaped; but his reasoning was very fair for a commencement. "Though all these spots," he observes, "are in appearance but little, and most of them but a few minutes in diameter; yet since they are among the fixed stars, that is, since they have no annual parallax, they cannot fail to occupy spaces immensely great, and perhaps not less than our whole solar system. In all these so vast spaces it should seem that there is a perpetual uninterrupted day, which may furnish matter of speculation, as well to the curious naturalist as to the astronomer."

This fine object is on the shield by which Hevelius intended, FOR EVER, to honour the name of John III., king of Poland. In the *Prodromus Astronomiæ*, he appears to be uncommonly elated on having raised it to the perpetual memory of the glorious liberator of Vienna—"ob immensa ejus merita, heroicas animi dotes, magnanimitatem, et ob res strenuè, ac fortiter gestas." He was delighted in being able to place it in the happiest part of the firmament, where all the members and neighbours are significant. "I wish you to know, benevolent reader," he says, "that this shield consists of seven lucid stars, partly of the 4th magnitude; 4 of these are placed in the border of this shield, and designate the princes of our serene king, who at that time were all among the living. In the middle of the shield I have designed a cross, in eternal remembrance of the battles most happily fought by him for the Christian faith: 3 notable stars shine in this cross, of which one indicates his own royal person, another the queen's, and a third the princess's, his only daughter; so that these seven stars represent the whole reigning family." This, and much more, shows his anxiety and hope of its eternal duration; but, poor fellow, when Baily took the field Sobieski was one of the first among the asterisms doomed to proscription. His pruning-knife might have been applied to many other interlopers, most of whom are far more petty than this.

["Smyth's sketch is utterly unlike the original in my $8\frac{1}{2}^{\text{in}}$ refractor, 1864, for the general outline is rather square. More particularly Smyth's rounded apex is to me nearly a right angle."—*Brodie.* Engraved, Lamont, *Nebelflecken*, Pl. i. Fig. 9.]

1281. 226 P. XVIII. DRACONIS. (Σ. 2410.) DCLXVII.

	h.	m.	s.			s.
R. A.	18	45	20	Prec.	+	0·87
		°	′			″
Decl.	N 59	12·3		—	N	3·94

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	97·5	...	1·49	...	1833·20
Wilson	95·3	...	1·44	...	1874·15

A close double star, in the middle of Draco's neck, and nearly halfway between γ Ursæ Minoris and δ Cygni. A 8 and B 9, both silvery white, with a neat pair of small stars in the field, and followed on the parallel at about 4^{m} by the bright binary system, *o* Draconis. This is a beautiful object, but, from the inflection of light, rather difficult to manage.

1282. 78 B. TAURI PONIATOWSKII. (Σ. 2404.)

R. A.	h. 18 m. 45 s. 35	Prec.	+ s. 2·82
Decl.	N 10° 50′·8	——	N ″ 3·97

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	183·1	...	3·5	...	1829·09
Main	184·8	...	3·7	...	1865·47
Jedrzejewicz	183·0	...	3·6	...	1876·78

A double star. A 6, yellow; B 7·5, blue. The colours are said to be somewhat remarkable.

1283. ν^1 LYRÆ. DCLXV.

R. A.	h. 18 m. 45 s. 40	Prec.	+ s. 2·23
Decl.	N 32° 41′·2	——	N ″ 3·97

		Position.		Distance.		Epoch.
		°		″		
Herschel, W.	A C	118·5	...	56·8 ±	...	1781·73
Knott	A E	352 ±	...	90	...	1862·85
Burnham	A B	70·8	...	36·0	...	1879·36
	A C	122·4	...	58·5		
	C D	212·3	...	17·5		

A multiple star on the cross-piece of the Lyre. A 6, pale yellow; B 13, bluish; C 11, pale blue; D 15, blue; and there are three other stars in the field. Ħ. only measured A and C, though, perceiving B and not D, he records it as triple. [Knott's E is of mag. 12. It is "not referred to in the *Cycle*, but it makes a neat addition to the group."]

This very delicate set is followed by ν^2 Lyræ, a whitish star of the 6th magnitude, at an angle of 175°, and a distance of about 15′ of space; and they are both just to the S. of β.

1284. β LYRÆ. (Σ. 39 App. I.) DCLXVI.

	h.	m.	s.			s.
R. A.	18	46	1	Prec.	+	2·21
		°	′			″
Decl.	N	33	14·1	——	N	4·00

	Position.		Distance.		Epoch.
	°		″		
Main	A B 148·8	...	46·5	...	1868·79
Burnham	A B 149·1	...	45·6	...	1878·39
	A C 248·0	...	46·3	...	1878·36
	A D 317·7	...	66·5	...	1879·36
	A E 18.6	...	85·6		

A *Nautical Almanac* star, which, with its companions, forms a quadruple system on the frame of the Lyre. A 3, very white and splendid; B 8, pale grey; C 13; D 8½, faint yellow; E 9, lilac; and there is a neat but minute double star in the S. vertical. The two principal components of this object, as was remarked by H. and S., are nearly coincident with the neighbouring ζ Lyræ, both in angle and distance; but the comparison cannot be applied to the relative brightness. Piazzi noticed the acolyte B, but considered it hardly visible; “3″ temporis,” he says, “1′ circiter ad austrum sequitur alia vix pene visibilis:” yet he must also have observed it as one of his meridian objects. [C was discovered by Burnham with the Washington 26^{in} refractor.]

β Lyræ is called Sheliak, but improperly, since the word was corrupted by the Arabians from the Greek χέλυς, a name intended to designate the whole asterism. A line drawn from α Lyræ to α Aquilæ, about one-quarter the distance, passes between β and γ Lyræ, which are very readily distinguishable in the lower, or southern part of the instrument; or, as our galley poet expresses it,

Along the line from Wega down, near six degrees in space,
Tow'rds Altair, in the Eagle's neck, you'll pitch on Sheliak's place.

This star has been added to the *stellæ versatiles.* Ptolemy rated it γ in brightness, and most of his successors also ranked it a 3rd magnitude, except Hevelius, who classed it 3½. It is now less bright than γ, its neighbour, which we may presume was not the case when Bayer lettered them. It was, however, pronounced to be variable by Goodricke. Cassini, when he observed the new star of 1670, in Collo Cygni, compared it frequently with β and γ Lyræ, without perceiving or suspecting that β was variable. A standard scale of magnitudes is a desideratum.

[The period may now be stated to be 12^{d} 21^{h} 53^{m}, and the range 3¼ to 4½ mags.]

1285. 47 H̥. I. AQUILÆ. (h. 3762; H. 4441.)

	h.	m.	s.			s.
R. A.	18	47	7	Prec.	+	3·27
		°	′			″
Decl.	S	8	50·1	——	N	4·10

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; p B; v L; ir; vglb M; rrr;" which means:—"a globular cluster; pretty bright; very large; irregular; very gradually less bright in the middle; well resolved—clearly seen to consist of stars." In the *Cape Obs.* Sir J. Herschel states that this cluster is 6′ in diameter and is "a fine object, the stars being very close and numerous."

1286. 54 M. SAGITTARII. (h. 3763; H. 4442.)

	h.	m.	s.			s.
R. A.	18	48	1	Prec.	+	3·84
		°	′			″
Decl.	S	30	36·8	——	N	4·17

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v B; L; R; g,smb M; rrr; st 15;" which means:—"a globular cluster; very bright; large; round; at first gradually, then suddenly much brighter in the middle; well resolved—clearly seen to consist of stars, which are chiefly of the 15th magnitude." Engraved, several degrees out of place, in the small S. D. U. K. Maps.

Precedes ζ Sagittarii, a star of mag. 3½, by $7^m\ 36^s$, and 34′ to the S.

1287. 57 M. LYRÆ. (h. 2023; H. 4447; ℜ.) DCLXIX.

	h.	m.	s.			s.
R. A.	18	49	28	Prec.	+	2·22
		°	′			″
Decl.	N	32	53·6	——	N	4·30

This annular nebula [the only one at all within the reach of small telescopes] lies between β and γ on the cross-piece of the Lyre, and forms the apex of a triangle which it makes with two stars of the 9th magnitude; its form is that of an elliptic ring, the major axis of which trends *sp* and *nf*. This wonderful object seems to have been noted by Darquier, in 1779; but neither he nor his contemporaries, Messier and Méchain, discerned its real form, seeing in this aureola of glory only "a mass of light in the form of a planetary disc, very dingy in colour." Sir W. Herschel called it a perforated resolveable nebula, and justly ranked it among the curiosities of the heavens. He considered the vertices of the longer axis less bright and not so well defined as the rest; and he afterwards added, "By the observations of the 20ft telescope, the profundity of the stars, of which it probably consists, must be of a higher than the 900th order, perhaps 950." This is a vast view of the ample and inconceivable dimensions of the spaces of the Universe; and if the oft-cited cannon-ball, flying with the uniform velocity of 500 miles an hour, would require millions of years to reach Sirius, what an incomprehensible time it would require to pass so overwhelming an interval as 950 times the distance! And yet, could we arrive there, by all analogy, no boundary would meet the eye, but thousands and tens of thousands of other remote and crowded systems would still bewilder the imagination.

In my refractor this nebula has a most singular appearance, the central vacuity being black, so as to countenance the trite remark of its having a hole through it. Under favourable circumstances, when the instrument obeys the smooth motion of the equatorial clock, it offers the curious phenomenon of a solid ring of light in the profundity of space. The annexed sketch affords a notion of it.

Sir J. Herschel, however, with the superior light of his instrument, found that the interior is far from absolutely dark. "It is filled," he says, "with a feeble but very evident nebulous light, which I do not remember to have seen noticed by former observers." Since Sir John's observation, the powerful telescope of the Earl of Rosse has been directed to this subject, and under powers 600, 800, and 1000, it displayed very evident symptoms of resolveability at its minor axis. The fainter nebulous matter which fills it was found to be irregularly distributed, having several stripes or wisps in it, and the regularity of the outline was broken by appendages branching into space, of which prolongations the brightest was in the direction of the major axis. [Secchi resolved this object into minute stars glittering like silver dust, yet Huggins considers that it yields a gaseous spectrum. Measures by Hall of 9 faint stars near the edge of the nebula will be found in *Ast. Nach.*, No. 2186.]

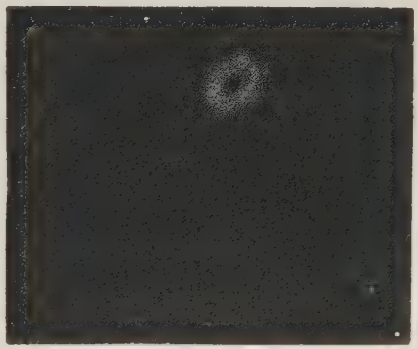

FIG. 42. 57 M. LYRÆ.

[Engraved, *Phil. Trans.*, 1833, Pl. ii. Fig. 29; *Phil. Trans.*, 1844, Pl. xix. Fig. 29; D'Arrest, *Dissertation*, Pl. ii. Fig. 5; D'Arrest, *Siderum Nebulosorum*, p. 334; Holden, *Washington Obs.*, 1874, Pl. vi. Fig. 2.]

1288. *o* DRACONIS. (Σ. 2420.) DCLXXII.

		h.	m.	s.			s.
R. A.		**18**	**49**	**34**	Prec.	+	0·88
Decl.	**N**	**59°**	**15′·3**		——	N	4″·31

	Position.		Distance.		Epoch.
Herschel, W.	360°·0	...	26″·6	...	1780·76
Herschel, J., and South	349·2	...	29·9	...	1822·14
Smyth	347·6	...	30·4	...	1830·78
Struve, O.	345·1	...	30·6	...	1840·84
Struve, O.	342·7	...	30·8	...	1851·67
Dembowski	340·6	...	31·0	...	1863·14
Flammarion	339·4	...	31·8	...	1877·76

A neat double star, in a fine field, on Draco's neck, and midway between γ Ursæ Minoris and δ Cygni. A 5, orange yellow; B 9, lilac. The angle of position has a *np sf*, or retrograde, motion; and the distance may have increased.

["Probably a case of rectilinear motion."—*Gledhill.*]

1289. 490 B. HERCULIS. (Σ. 2415.)

		h.	m.	s.			s.
R. A.		**18**	**49**	**48**	Prec.	+	2·58
Decl.	**N**	**20°**	**28′·2**		——	N	4″·32

	Position.		Distance.		Epoch.
Struve, W.	298°·6	...	2″·00	...	1831·55

A double star. A 7, yellowish; B 9, bluish.

1290. δ LYRÆ.

		h.	m.	s.			s.
R. A.		**18**	**49**	**52**	Prec.	+	2·09
Decl.	**N**	**36°**	**50′·3**		——	N	4″·33

A star with a distant companion which is known as δ^2 Lyræ. A 4, orange; B 5, white. "Glorious field for low powers."—(*Webb.*)

1291. θ^1 SERPENTIS. (Σ. 2417.) DCLXX.

	h.	m.	s.			s.
R. A.	18	50	45	Prec.	+	2·98
		°	′			″
Decl.	N	4	3·4	——	N	4·41

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	104·0	...	21·6	...	1822·73
Smyth	103·9	...	21·6	...	1834·78
Dunér	103·6	...	21·5	...	1868·76
Jedrzejewicz	103·6	...	21·6	...	1877·37

A neat double star on the tip of the Serpent's tail, lying about 14° to the E.S.E. of α Aquilæ. A 4½, pale yellow; B 5, golden yellow, being θ^2; and there are other stars in the field. This is a fair and easy object for a moderate telescope. There appears to have been no appreciable alteration beyond what may be charged to the proper motions in space of A.

On the strength of a great number of observations, Piazzi also assigns a special movement to B; but subsequent experience has not confirmed his conclusion.

This star appears in Piazzi and other Catalogues as Alya, supposed to be the Arabic *alyah*, a broad sheep's tail; but no such name is known to the Arabian astronomers. Nor is it the name only which has given rise to discussion, for there is much uncertainty as to its magnitude. Ptolemy ranked it 6 in brightness, and was followed by Ulugh Beigh, La Caille, and Pigott; but Tycho Brahé, Hevelius, Bayer, Flamsteed, Bradley, and De Zach made it of the 3rd magnitude; Piazzi and myself saw it constantly 4½; and Montanari found it of the 5th. It must, therefore, be variable, and should be carefully watched. [But no modern observations appear to exist countenancing the variability of this star.]

1292. 91 B. LYRÆ. (O. Σ. 525.)

	h.	m.	s.			s.
R. A.	18	50	51	Prec.	+	2·2
		°	′			″
Decl.	N	33	49·7	——	N	4·39

		Position.		Distance.		Epoch.
		°		″		
Struve	A B	128·0	...	1·5	...	1849·70
Dembowski	A B	132·8	...	1·3	...	1869·77
	A C	350·6	...	45·4		
Burnham	A B	125·7	...	1·7	...	1879·50
	A C	350·6	...	45·3		

A triple star. A 6, yellow; B 10; C 7, blue. A and C form "a charming miniature of β Cygni; the colours very fine." (*Knott.*) O. Struve expresses surprise that A C should have been measured 3 times without B having been noticed.

1293. 2024 h. AQUILÆ. (h. 2024; H. 4451.) DCLXXI.

		h. °	m. ′	s.			s. ″
R. A.		18	51	50	Prec.	+	2·83
Decl.	N	10	13·0		——	N	4·41

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	218·6	...	11·2	...	1879·54

A double star on the verge of a bright coarse cluster, on the bird's southern wing. A [9], yellow; B [10], dusky; and there is another neat pair preceding these, having a distance of 25″ between them.

This object is in a barren vicinity between the two astral streams of the Milky Way. It lies 6° to the N. of θ Serpentis, above described; and about 12° to the E. of γ Aquilæ, on its parallel. [Burnham makes the R.A. of this object, $18^h\ 46^m\ 22^s$ for 1890.]

1294. 573 Dunlop SAGITTARII. (h. 3770; H. 4450.)

		h. °	m. ′	s.			s. ″
R. A.		18	52	6	Prec.	+	4·05
Decl.	S	36	46·5		——	N	4·51

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; v L; vl E; vgb M; rrr; st 14 ... 15;" which means:—"a globular cluster; very large; very little extended; very gradually brighter in the middle; well resolved—clearly seen to consist of stars, which are chiefly of the 14th and 15th magnitudes."

1295. 11 AQUILÆ. (Σ. 2424.) DCLXXIII.

		h. °	m. ′	s.			s. ″
R. A.		18	54	2	Prec.	+	2·76
Decl.	N	13	28·8		——	N	4·69

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	236·4	...	20·0	...	1820·64
SMYTH	240·9	...	19·1	...	1832·61
MÄDLER	247·5	...	17·4	...	1852·05
DOBERCK	256·7	...	16·7	...	1877·52

A delicate double star on the Eagle's tail, where it forms the S.W. vertex of an equilateral triangle with ϵ and ζ. A 7, pale white; B 10, smalt blue, accompanied by a wide pair of stars in the *nf* quadrant. This object is rather difficult to measure, from the feebleness of the *comes*.

The magnitude of the primary is assumed from the Palermo Catalogue, which is the plan throughout this *Cycle*; but it certainly appeared bright enough to be rated among the 6th, on careful comparison.

[The above changes are considered by Gledhill to be "probably due to the proper motion of the brighter star."]

1296. 263 P. XVIII. AQUILÆ. (Σ. 2428.) DCLXXIV.

R. A.	18h 54m 56s	Prec. + 2·73s
Decl.	N 14° 45′·6	—— N 4″·76

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	286·0	...	5·0 ±	...	1783·40
Struve, W.	288·6	...	6·4	...	1830·96
Smyth	289·1	...	6·5	...	1836·55
Main	285·0	...	6·5	...	1861·47

A fine double star on the Eagle's tail, closely following the bright star ε. A 8½, pale yellow; B 10½, sapphire blue. This handsome test-object was discovered by Sir W. Herschel, and seems to have undergone no change, either in angle or distance.

[Closely following, but 10′ S. of, ε Aquilæ, a fine yellow star of mag. 3.]

1297. 287 P. XVIII. DRACONIS. (Σ. 2438.) DCLXXVII.

R. A.	18h 55m 40s	Prec. + 0·99s
Decl.	N 58° 4′·4	—— N 4″·82

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	355	...	1	...	1782·68
Smyth	341·0	...	0·7	...	1834·53
Dawes	335·1	...	0·65	...	1841·80
Dembowski	330·0	...	*elongated*	...	1863·62
Struve, O.	...	...	*single*	...	1870·90

A close double star, in the back of Draco's neck, and about 1° S. of ο Draconis, a star of mag. 5. A 7, white; B 8, pale red. Σ. designates it "pervicina." To me it is only elongated sufficiently to allow of my catching a measure at the angle, though notches appear at intervals.

[Certain change in angle and distance. The peri-astron was probably passed either between 1842 and 1870, or since the latter year.—*O. Struve.*]

1298. 223 B. DRACONIS. (Σ. 2440.)

		h.	m.	s.			s.
R. A.		18	56	11	Prec.	+	0·61
		°	′				″
Decl.	N	62	14·8		——	N	4·87

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	123·4	...	16·6	...	1832·27

A double star. A 7, yellow; B 9½.

1299. 2426 Σ. AQUILÆ.

		h.	m.	s.			s.
R. A.		18	56	42	Prec.	+	2·78
		°	′				″
Decl.	N	12	44·6		——	N	4·76

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	79·7	...	16·9	...	1829·40
Main	77·7	...	16·9	...	1864·74

A double star. A 7½, reddish yellow; B 9, ash-coloured.

1300. 274 P. XVIII. ANTINOI. (Σ. 2434.) DCLXXVI.

		h.	m.	s.			s.
R. A.		18	57	5	Prec.	+	3·09
		°	′				″
Decl.	S	0	51·9		——	N	4·95

		Position.		Distance.		Epoch.
		°		″		
Struve, W.	A B	147·0	...	25·56	...	1831·57
	B C	80·5	...	1·93		
Smyth	A B	146·8	...	25·6	...	1838·59
	B C	85·0	...	2·0		
Dembowski	A B	136·8	...	24·29	...	1864·66
	B C	69·6	...	1·79		
Cincinnati Obs.	A B	133·6	...	24·31	...	1877·68
	B C	63·2	...	1·51		
Burnham	A B	131·9	...	23·84	...	1880·64
	B C	62·9	...	1·46	...	1880·59

A delicate triple star, between the Eagle's wing and the left heel of Antinoüs; and 15° to the S. of the 2 bright stars in the Eagle's tail. A and B, both 9, and both white; C 16, blue; many other minute stars in the field. Σ. discovered C, and made it a triple object. The *nova*, however, is so exceedingly small, that I only caught it by occasional glimpses; and then flitting, it recalled Burns's flake of snow on a running stream. [Knott found C in 1862 to be much brighter than Smyth's estimate implies. "In A B the motion is rectilinear. B C form a physical system in rapid motion."—*Gledhill.*]

1301. 233 B. DRACONIS. (Σ. 2452.)

		h.	m.	s.			s.
R. A.		18	57	16	Prec.	−	1·95
		°	′				″
Decl.	N	75	38·0		——	N	4·96

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	219·7	5·6	1832·09
Main	215·6	5·6	1863·37
Stone, O.	218·2	5·6	1878·81

A double star. A 7, white; B 8, white.

1302. 483 Birm. AQUILÆ.

		h.	m.	s.			s.
R. A.		18	58	32	Prec.	+	3·21
		°	′				″
Decl.	S	5	50·9		——	N	5·07

A very deep red star of mag. 7½, first noted as regards its colour by Knott, 1861. Webb describes it as a "fine specimen of a remarkable and beautiful class." 40′ *f* 12 Aquilæ, a 6th mag. star.

1303. γ CORONÆ AUSTRALIS. (*h. 5084.)

		h.	m.	s.			s.
R. A.		18	59	0	Prec.	+	4·06
		°	′				″
Decl.	S	37	12·9		——	N	5·11

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	37·1	*not given*	1834·47
Herschel, J.	32·7	2·66	1837·32
Stone, O.	62·6	1·36	1878·49
Burnham	60·0	0·87	1879·69

A double star. A 6; B 6. Sir J. Herschel calls this "superb." The measures seem to imply movement.

1304. 15 AQUILÆ. DCLXXVIII.

		h.	m.	s.			s.
R. A.		18	59	9	Prec.	+	3·17
		°	′				″
Decl.	S	4	11·7		——	N	5·12

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	206·7	35·6	1823·52
Smyth	206·6	34·5	1831·58
Main	27·4	37·1	1869·61

A fine double star, on the left heel of Antinoüs; it is midway between β Ophiuchi and α Capricorni, and rather more than 1° N. ½ W. of the bright star λ Antinoi. A 6, [yellowish]; B 7½, lilac; other small stars in the field. No sensible alteration has occurred.

[Main has taken Smyth's B for A and *vice versa.*]

1305. 262 Dunlop PAVONIS. (h. 3776; H. 4464.)

		h.	m.	s.			s.
R. A.		18	59	18	Prec.	+	5·73
		°	′				″
Decl.	S	64	1·5		——	N	5·13

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; c L; R; vg, svmb M; r;" which means:—"considerably bright; considerably large; round; at first very gradually, then suddenly very much brighter in the middle; hardly resolveable—mottled as if with stars."

1306. 1 B. VULPECULÆ. (Σ. 2445.)

		h.	m.	s.			s.
R. A.		19	0	1	Prec.	+	2·52
		°	′				″
Decl.	N	23	10·1		——	N	5·20

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	263·4	12·1	1830·74
Main	260·6	12·8	1863·77

A double star. A 6½, very white; B 8½, ashy. This star lies within the boundaries of the sham constellation Anser.

1307. 302 P. XVIII. AQUILÆ. (Σ. 2446.) DCLXXX.

		h.	m.	s.			s.
R. A.		19	0	25	Prec.	+	2·93
		°	′				″
Decl.	N	6	23·0		——	N	5·22

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	154·6	10·1	1831·70
Smyth	153·9	10·3	1838·75
Seabroke	153·5	9·9	1874·67

A very neat double star, on the margin of the Eagle's lower wing. A 7½, lucid white; B 9, cerulean blue; and the two point to a 10th magnitude star in the *np* quadrant, at about three times the distance between A and B.

This star lies on the preceding border of the following branch of the

Milky Way; it is 10° due N. of λ Antinoi, a star of the 3rd magnitude, and on the western parallel of β Aquilæ, from which it is about 13° distant. It is not difficult to pick up, being the brightest of its immediate neighbourhood.

1308. 295 Dunlop PAVONIS. (h. 3778; H. 4467.)

		h.	m.	s.			s.
R. A.		19	1	7	Prec.	+	5·32
		°	′				″
Decl.	S	60	9·2		——	N	5·29

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"⊕; B; v L; i R; rrr; st 11 . . . 16;" which means:—"a globular cluster; bright; very large; irregularly round; well resolved—clearly seen to consist of stars, which range from the 11th to the 16th magnitudes."

1309. 19 H. VII. AQUILÆ. (h. 2030; H. 4470.)

		h.	m.	s.			s.
R. A.		19	2	19	Prec.	+	2·98
		°	′				″
Decl.	N	4	3·4		——	N	5·39

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; v Ri; p C; st 12 . . . 14;" which means:—"a cluster; very large; very rich; pretty condensed; the component stars range from the 12th to the 14th magnitudes."

1310. 17 LYRÆ. (Σ. 2461.) DCLXXXII.

		h.	m.	s.			s.
R. A.		19	3	16	Prec.	+	2·26
		°	′				″
Decl.	N	32	19·7		——	N	5·47

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	330·6	3·7	1830·72
Smyth	329·9	3·6	1838·82
Dembowski	323·7	3·7	1868·86

A double star on the following edge of the Lyre's cross-piece; where it is about 7½° S.S.E. of α, and pretty closely following γ. A 6, light yellow; B 11, cerulean blue; a third star at a distance in the *sf* quadrant. This is a very beautiful and delicate object.

1311. 8 P. XIX. LYRÆ. (Σ. 2469.) DCLXXXIII.

R. A.	19h 4m 3s	Prec.	+	2s·04
Decl.	N 38° 45′·2	——	N	5″·54

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	120·9	1·2	1831·05
Smyth	122·1	1·4	1834·86
Seabroke	120·9	1·3	1873·57

A close double star, on the frame-base of the Lyre, following Wega on the eastern parallel at 5° distance. A 7½, yellowish; B 9½, pale white, and so impracticable under illumination, that the spherical crystal micrometer was applied. This is one of the first-class "vicinæ" of Σ.

1312. 2470 Σ. LYRÆ.

R. A.	19h 4m 44s	Prec.	+	2s·19
Decl.	N 34° 35′·5	——	N	5″·59

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	271·5	12·9	1829·78
Dawes	271·3	13·3	1848·55
Main	270·0	13·3	1865·43

A double star. A 7, white; B 9, white.

1313. 13 P. XIX. LYRÆ. (Σ. 2472, 2473.) DCLXXXIV.

R. A.	19h 4m 45s	Prec.	+	2s·08
Decl.	N 37° 44′·1	——	N	5″·59

		Position.	Distance.	Epoch.
		°	″	
Smyth	A B	337	18	1835·73
	A C	350	74·8	
	C D	294	5	

A double-double star on the base of the Lyre, and about 5° E. ½ S. from Wega. A 8, bright yellow; B 11, pale grey; C 9½, greenish; D 12, dusky. This very difficult compound object was discovered by Σ. [Wilson and Seabroke have published measures which are so nearly identical with Smyth's as to show that no change has occurred. Knott makes the group quintuple, the 5th star being a 12½ mag. "on a line from A to B carried beyond to about ½ dist. to C D."]

1314. 8028 Lac. SAGITTARII. (*h. 5094.)

		h.	m.	s.			s.
R. A.		19	5	32	Prec.	+	3·95
		°	′				″
Decl.	S	34	0·5		——	N	5·66

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	243·3	15 *est.*	1837·44

A double star. A 7; B 7.

1315. 4473 H. AQUILÆ.

		h.	m.	s.			s.
R. A.		19	5	52	Prec.	+	3·05
		°	′				″
Decl.	N	0	51·0		——	N	5·67

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!; pB; pL; gbM; *Var.*? (Hind);" which means:—"a very remarkable object; pretty bright; pretty large; gradually brighter in the middle; Query? variable, according to Hind."

1316. 6 B. CYGNI. (Σ. 2486.)

		h.	m.	s.			s.
R. A.		19	9	16	Prec.	+	1·57
		°	′				″
Decl.	N	49	37·9		——	N	5·97

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	224·8	10·4	1832·48
POWELL	222·8	10·2	1847·36
MAIN	221·8	9·9	1863·31
DOBERCK	220·3	9·8	1877·45
JEDRZEJEWICZ	220·7	9·8	1879·93

A double star. A 6½, yellow; B 7, yellow. Both angle and distance appear to have diminished.

1317. η LYRÆ. (Σ. 2487.) DCLXXXV.

		h.	m.	s.			s.
R. A.		19	10	1	Prec.	+	2·04
		°	′				″
Decl.	N	38	57·5		——	N	6·03

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	84·0	29·3	1823·46
SMYTH	84·8	28·3	1834·74
MAIN	83·9	27·0	1861·48
JEDRZEJEWICZ	83·6	28·5	1877·59

A neat double star on the following part of the frame, nearly on the parallel and 6° E. of Wega. A 5, sky-blue; B 9, violet tint. [On several occasions in 1862 Knott saw A as a yellow star.] This is a fair object for a moderate telescope, as it is sharply defined and bears illumination capitally: it is followed in the *sf* quadrant, about 90ˢ, by an open double star, which is H. and S. 289.

Christian Mayer observed η and "its satellite," as recorded in *De Novis in Cœlo Sidereo Phænomenis*, 1779.

["A low-power field includes 2 other small pairs, *sp* and *f*."—*Webb.*]

1318. 2034 h. SAGITTARII. (H. 4481; ℞.)

		h.	m.	s.			s.
R. A.		19	10	22	Prec.	+	3·45
		°	′				″
Decl.	S	16	27·6		——	N	6·05

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vL; lC;" which means:—"a cluster; very large; little compressed."

1319. 2035 h. AQUILÆ. (H. 4482.) DCLXXXVI.

		h.	m.	s.			s.
R. A.		19	11	11	Prec.	+	3·10
		°	′				″
Decl.	S	1	6·9		——	N	6·13

A loose cluster between the lower wing of the Eagle and the thigh of Antinous, about 13° S.W. of α Aquilæ, in the direction of a line from α Lyræ passed through ε Aquilæ. It consists of a splashy group of stars from the 9th to the 12th magnitudes, trending *np* and *sf*, with three brighter ones, about 7½, in the *sf* portion. Attentive gazing, under the smooth motion of the equatorial clock, brings up the points of light, and reveals an indication of star dust. It is on the eastern margin of the Milky Way, but there are few neighbours of note near it.

1320. 43 P. XIX. SAGITTARII. DCLXXXVII.

		h.	m.	s.			s.
R. A.		19	11	45	Prec.	+	3·51
		°	′				″
Decl.	S	18	53·8		——	N	6·18

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	168·7	36·0	1782·60
BURNHAM	159·0	39·9	1879·41

A wide double star following the Archer's head, and terminating an outcrop of the Galaxy: it is 30° to the S.S.W. of α Aquilæ, where it is the preceding of a group of small stars. A 8, white; B 11½, pale grey; in a field of stragglers, of which the largest, in the *np* quadrant, is of an orange tinge.

1321. 56 M. LYRÆ. (h. 2036; H. 4485; ℜ.) DCLXXXVIII.

	h. m. s.		s.
R. A.	**19 12 16**	Prec.	+ 2·34
Decl.	**N 29° 59′·3**	——	N 6″·22

A globular cluster, in a splendid field, between the eastern yoke of Lyra's frame and the Swan's head: it is 5½° distant from β Lyræ, on a S.E. line leading to β Cygni, which is about 3½° further. This object was first registered by Messier in 1778, and, from his imperfect means, described as a nebula of feeble light, without a star. In 1784 it was resolved by Sir W. Herschel, who, on gauging, considered its profundity to be of the 344th order.

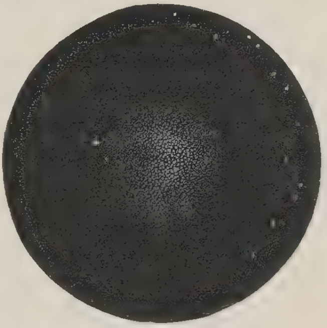

FIG. 43. 56 M. LYRÆ.

1322. δ DRACONIS. DCXCI.

	h. m. s.		s.
R. A.	**19 12 31**	Prec.	+ 0·02
Decl.	**N 67° 28′·0**	——	N 6″·24

	Position.		Distance.		Epoch.
BURNHAM	27°·7	...	154″·7	...	1879·66

A bright star with a distant companion, in the first flexure of Draco. A 3, deep yellow; B 9½, pale red; other small stars in the field.

δ Draconis is the Nodus Secundus of various catalogues, and though rejected from the *Nautical Almanac* list in 1830, is a notable star. Ptolemy marked it δ in lustre, and designated it ὁ βορειότερος. Flamsteed, however, registered it *austrina*, but erroneously; and Baily thinks he was "probably led into this mistake from considering its position with respect to the pole of the equator; whereas all Ptolemy's descriptions refer to the pole of the ecliptic." It is the most northern star on the western side of the square formed by δ, π, ρ, and ϵ; and is 18° to the N.N.E. of γ Draconis. [Burnham found a 12th mag. star nearer to A than the above companion, namely in Pos. 354°; Dist. 90″; Epoch 1879·35.]

1323. 23 AQUILÆ. (Σ. 2492.) DCLXXXIX.

	h. m. s.		s.
R.A.	19 12 56	Prec. +	3·05
	° ′		″
Decl.	N 0 53·1	—— N	6·28

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	11·1	3·4	1830·30
SEABROKE	11·5	3·4	1873·57
BURNHAM	11·6	3·3	1880·69

A close double star, under the Eagle's southern wing. A 6, light orange; B 10, grey. This elegant object must be 14 H. I., instead of 24 Aquilæ, its neighbour in the *sf*, which is a single star. Sir William's position, however, is at variance with this conclusion, being

Position.	Distance.	Epoch.
°	″	
162	3·5 ±	1781·58

but if a mistake of noting *s* for *n* in the quadrant has occurred, it will only differ 5° 21′ from my results. Indeed, in his mentioning the improvement of the *comes* under magnifying powers, the description answers so well for Flamsteed's 23, that I conclude there can be no question about it. It may be found to the S.S.W. of *a* Aquilæ, at 12° distance, where a line through the heads of Hercules and Ophiuchus reaches it.

[Webb notes that B is better seen with a high power than with a low one: "possibly there may be some peculiar quality in its light."]

1324. 28 AQUILÆ. DCXC.

	h. m. s.		s.
R.A.	19 14 31	Prec. +	2·80
	° ′		″
Decl.	N 12 10·3	—— N	6·41

	Position.	Distance.	Epoch.
	°	″	
SOUTH	175·0	59·2	1825·04
DEMBOWSKI	175·2	60·2	1873·60

A wide and unequal double star, on the Eagle's back; it is 8° distant from *a*, on a W.N.W. line leading upon ε, in the tail. A 6, pale white; B 10, deep blue.

1325. β^1 SAGITTARII.

	h. m. s.		s.
R.A.	19 14 44	Prec. +	4·33
	° ′		″
Decl.	S 44 40·1	—— N	6·43

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	78·6	29·1	1835·25

A double star. A 4½; B 8.

1326. 108 P. XIX. DRACONIS. (Σ. 2509.) DCXCII.

	h. m. s.			s.
R. A.	19 15 47	Prec.	+	0·59
Decl.	N 63 0·5 (° ′)	——	N	6·51 (″)

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	356·7	...	0·42	...	1831·96
Smyth	349·0	...	0·5	...	1833·78
Secchi	340·3	...	0·69	...	1857·43
Gledhill	341·8	...	1·0	...	1874·84

A close double star on Draco's neck, 4½° distant to the S. of δ Draconis. A 8, and B 9, both white. Σ. marked it "cuneus, ni fallor." But though a very difficult object, I found that it gave, at intervals of gazing, a very appreciable axis major.

[O. Struve infers a diminution in angle and increase in distance.]

1327. 2504 Σ. VULPECULÆ.

	h. m. s.			s.
R. A.	19 16 9	Prec.	+	2·64
Decl.	N 18 56·4 (° ′)	——	N	6·54 (″)

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	288·2	...	8·9	...	1830·52
Dunér	286·7	...	8·9	...	1868·49
Jedrzejewicz	286·9	...	8·9	...	1877·09

A double star. A 6½, yellowish white; B 8½, bluish. Dunér sometimes found these stars white, and sometimes yellow.

1328. 5112 *h. SAGITTARII.

	h. m. s.			s.
R. A.	19 17 4	Prec.	+	3·49
Decl.	S 18 12·0 (° ′)	——	N	6·62 (″)

		Position.		Distance.		Epoch.
		°		″		
Herschel, J.	A B	229·6	...	18 *est.*	...	1836·53
	A C	50 *est.*	...	20 *est.*		
	A D	180 *est.*	...	25 *est.*		
Stone, O.	A B	233·5	...	23·5	...	1877·70
	B D	137·8	...	23·7		

A quadruple star. A 8; B 8; C 8; D 12. B and D are A and C of *h. 2866.

1329. 128 P. XIX ANSERIS. (Σ. 2521.) DCXCIV.

		h.	m.	s.			s.
R. A.		**19**	**21**	**40**	Prec.	+	2·62
		°	′				″
Decl.	**N**	**19**	**40·4**		——	N	7·00

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	43·5	...	22·6	...	1829·40
Smyth	43·5	...	22·2	...	1848·06
Struve, O.	39·6	...	23·8	...	1868·75

A very delicate double star on the Goose's foot, in a small group to the N.N.W. of Altair, and at one-third the distance between that star and Wega. A 6½, topaz yellow; B 13, deep blue; and A is the apex of a scalene triangle with two other stars to the N. of it.

[Gledhill says, "certain change in angle and distance."]

1330. 21 H. VIII. ANSERIS. (h. 2041; H. 4497.) DCXCV.

		h.	m.	s.			s.
R. A.		**19**	**22**	**34**	Prec.	+	2·49
		°	′				″
Decl.	**N**	**24**	**55·1**		——	N	7·07

A large straggling cluster, on the neck of the Goose, and about 3° distant from β Cygni. It is preceded by a couple of 7th magnitude stars, and is remarkable for its brightest members assuming the form of a Greek Ω, even more strongly than 17 M. There is much star-dust in glimpses, at the lower opening of the *omega*, and also at the top of the field; but the distinctness is greatly interfered with by the brightness of the leaders.

1331. 149 P. XIX. CYGNI. (Σ. 2534.) DCXCVI.

		h.	m.	s.			s.
R. A.		**19**	**23**	**43**	Prec.	+	2·15
		°	′				″
Decl.	**N**	**36**	**18·4**		——	N	7·16

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	60·8	...	6·0±	...	1782·82
Herschel, J., and South	66·7	...	7·4	...	1823·57
Smyth	61·9	...	7·0	...	1833·79
Seabroke	62·5	...	7·2	...	1871·83

A very elegant double star between the Lyre and the Swan's neck, about 8° to the N. of β Cygni, and on the *nf* of a 4th magnitude star. A 8½, white; B 9, pale blue.

1332. 6 and 8 VULPECULÆ. (Σ. 42 App. I.) DCXVII.

R. A.	$19^{h.}\ 24^{m.}\ 8^{s.}$	Prec.	+	$2^{s.}{\cdot}50$
Decl.	N $24^{\circ}\ 26'{\cdot}6$	——	N	$7''{\cdot}20$

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	27·7	...	396·1	...	1835·9
DEMBOWSKI	27·8	...	402·7	...	1856·7
JEDRZEJEWICZ	27·8	...	403·5	...	1879·67

A pair of stars close to Reynard's nose. A 4, deep yellow; B 5. This is to the S. of β Cygni, 3½° distant, and shows how even modern asterisms become distorted for the want of well-defined boundaries; for though designated in Vulpecula, it is on the neck of the Goose, and actually the *lucida* of Anseris.

Vulpecula-et-Anser is a modern constellation, crowded in by Hevelius to occupy a space between the Arrow and the Swan, where the Via Lactea divides into two branches. For this purpose he ransacked the *informes* of this bifurcation, and was so satisfied with the result, that the effigies figure in the elaborate print of his offerings to Urania. He selected it on account of the Eagle, Cerberus, and Vultur cadens. "I wished," said he, "to place a fox with a goose in the space of sky well fitted to it; because such an animal is very cunning, voracious, and fierce. Aquila and Vultur are of the same nature, rapacious and greedy:" and therefore he deems the intrusion to be conformable to the fables of the poets and the rules of the astrologers. In 1672, while scrutinizing his asterism, he saw a new star in the head of the Fox; but it was visible for about two years only, nor has it been since identified. Vulpecula-et-Anser has been *almost* acknowledged by astronomers, and the two are often treated of distinctly and separately; collectively the constituents have thus gradually increased:

Hevelius . . .	27 stars.	Piazzi	88 stars.
Flamsteed . .	35 „	Bode	126 „

Much licence ought to be granted to Hevelius, as he placed most of his constellations where they seemed to be wanted; and they have become almost of standard authority. But all astronomers must be thankful that the rage for intruding new asterisms into the heavens has been checked.

1333. 144 P. XIX. AQUILÆ. (Σ. 2532.) DCXCVIII.

	h. m. s.			s.
R. A.	**19 24 39**	Prec.	+	3·01
	° ′			″
Decl.	**N 2 40·6**	——	N	7·24

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	5·0	34·9	1829·00
Smyth	4·9	37·0	1838·63
Stone, O.	4·6	35·5	1879·38

A very delicate though wide double star, on the border of the Eagle's lower wing, where it follows δ on the eastern parallel, at about 1°. A 7, deep yellow; B 11, pale green; several other minute companions are visible, and A and B point nearly upon a 9th magnitude star in the *nf* quadrant.

[Webb seems to think that B was brighter than 11th mag. both in 1850 and 1855. Knott in 1862 could not find any 9th mag. star in the *nf* quadrant, but he saw an 11th mag. in the *sp* quadrant, and a 9½ in the *np*, a long way off.]

1334. 14 ♅. VI. VULPECULÆ. (h. 2042; H. 4498; ℜ.)

	h. m. s.			s.
R. A.	**19 25 49**	Prec.	+	2·63
	° ′			″
Decl.	**N 20 2·6**	——	N	7·34

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; v C; E 0°; st 14 ... 18;" which means:—"a cluster; large; very condensed; extended in the direction of the meridian; the component stars range from the 14th to the 18th magnitudes."

1335. β CYGNI. (Σ. 43 App. I.) DCC.

	h. m. s.			s.
R. A.	**19 26 17**	Prec.	+	2·42
	° ′			″
Decl.	**N 27 43·7**	——	N	7·38

	Position.	Distance.	Epoch.
	°	″	
Bradley	57·5	34·2	1755·00
Herschel, W.	54·9	34·8	1782·45
Struve, W.	54·5	34·3	1821·76
Smyth	55·6	34·4	1837·58
Fletcher	54·9	34·8	1864·53
Knott	55·8	33·8	1871·77
Jedrzejewicz	55·8	34·8	1879·73

A bright double star on the Swan's bill, about 13½° to the S.S.E. of α Cygni. A 3, topaz yellow; B 7 [or brighter?], sapphire blue; the colours in brilliant contrast, by which term I do not mean the mere optical complementary tints, but relating to these bodies as radiating their own coloured lights. The various measures of this fine object exhibit a very remarkable relative constancy both in angle and distance, especially as both the components appear to be affected with proper motions, the amount of which does not differ so much in the several reductions, as in the course or direction of the march.

Ulugh Beigh and Tízíní call β Cygni, *Minkár el dejájeh,* the hen's beak; but its more usual appellation is Albireo. This name is of doubtful origin, introduced, as it appears, by Bayer, and conjectured by Ideler to be a corruption of "ab ireo" in the Latin version of the *Almagest,* where the translator from the Arabic *euris* for *ornis* made *eurisim,* which he supposed to be the Greek Ἐρύσιμον, in Latin *Irio.* Hence the *Hierezim* of Riccioli, whose *Astronomia Riformata* exhibits some curious blunders of black-letter transcription. A search among the archives of Spain might probably bring the original MS. of the Alphonsine Tables to light; and such a discovery would well reward any pains that might be taken.

1336. 38 H. VI. AQUILÆ. (h. 2043; H. 4499; ℜ.) DCXCIX.

	h. m. s.		s.
R. A.	19 26 18	Prec. +	2·87
Decl.	N 9° 0′·1	—— N	7″·38

A stellar nebula on the Eagle's back, preceding α on the W. parallel by about 5°. This is a minute object in a rich Milky-Way field of stars, of 8th to 15th magnitudes; and in the most powerful telescopes it has a fan-shaped appearance. Sir W. Herschel discovered it with his 20ft reflector in 1791; he saw it considerably bright and easily resolveable, estimating its profundity as of the 900th order, indicating a distance altogether overwhelming to the mind. In his review of this, also with a 20ft reflector, Sir J. Herschel says, "It is like a nebula well resolved, and is a curious object."

1337. 169 P. XIX. CYGNI. (Σ. 2539.) DCCI.

	h. m. s.		s.
R. A.	19 27 40	Prec. +	2·41
Decl.	N 28° 1′·9	—— N	7″·49

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	2·2	...	4·5 ±	...	1783·71
Struve, W.	5·2	...	5·3	...	1830·69
Smyth	5·2	...	5·8	...	1835·78
Seabroke	4·0	...	5·7	...	1873·57

A delicate double star in the Swan's mouth, a little *nf* β Cygni.

A 9, white; B 11, pale blue. Allowing for probable errors on so extremely difficult a star, it may have a slow direct orbital motion; but the fixity of its distance seems to be established by the coincidence of the results.

1338. 505 Birm. SAGITTARII.

	h.	m.	s.			s.
R. A.	19	28	0	Prec.	+	3·44
	°	′				″
Decl.	S 16	36·8		——	N	7·52

A red star of mag. 6½. Sir J. Herschel, "good ruby," 7; Webb, 1873, "fine ruby," 7½; Birmingham, 1870, "fine red," 7½.

1339. 185 P. XIX. ANTINOI. (Σ. 2541.) DCCII.

	h.	m.	s.			s.
R. A.	19	30	46	Prec.	+	3·30
	°	′				″
Decl.	S 10	40·5		——	N	7·74

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	339·5	...	2·84	...	1831·01
Secchi	337·6	...	3·47	...	1857·17
Wilson and Seabroke	330·2	...	2·76	...	1876·01
Stone, O.	330·5	...	3·71	...	1879·39

A double star, on the right knee of Antinous, and about 20° S. by W. from α Aquilæ, where it is closely following 37 Antinoi. A 9, light yellow; B 10, cerulean blue.

1340. ε SAGITTÆ. DCCIV.

	h.	m.	s.			s.
R. A.	19	32	18	Prec.	+	2·71
	°	′				″
Decl.	N 16	12·9		——	N	7·86

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	81·5	...	91·8	...	1780·84
Smyth	80·9	...	92·2	...	1833·78

A star with a distant companion, on the Eagle's northern or upper wing, about 8° to the N.N.W. of α Aquilæ, on the line towards α Lyræ. A 6, pale white; B 8, light blue.

While measuring this star on the 5th of October, 1833, the E. wind had an extraordinary effect. It often produces changes in the appear-one of the species of insects before; but during the time of the observation the specimen fluttered, whirled and turned, enlarged and expanded, and when close to the wire, seemed to flit about there like a butterfly. Returning to the same star on the 9th, with a fine [illegible] breeze, it moved with all the steadiness of a little planet. I record the circumstance, because both sets of measures were [illegible]; [illegible] therefore [illegible] not [illegible] to [illegible], when [illegible] [illegible] it is apparently [illegible].

1241. [illegible] 2 ANTINOI. [illegible]

R.A.	19h 42m [illegible]		Prec. +	[illegible]
Decl.	N [illegible]		— N	[illegible]

	Position.		Distance.		Epoch.
[illegible]	[illegible]		[illegible]		[illegible]
[illegible]	[illegible]		[illegible]		[illegible]
[illegible]	[illegible]		[illegible]		[illegible]
[illegible]	[illegible]		[illegible]		[illegible]

A triple star on the right knee of Antinous, and closely following [illegible] XII. Position a little to the S. A [illegible], pale white; B [illegible], [illegible] blue. This was [illegible] at [illegible], but no measures were [illegible], Sir W. Herschel merely stating that the two largest stars were apart half the diameter of the large one; and that the brightest was about 1" or 2" distant. He also well describes it as "the test star of a telescope with [illegible], similar to that in the head of Aquarius."

[This object appears to have been wrongly identified by Smyth with [illegible] XII. [illegible].]

1242. [illegible] H. CYGNI. [illegible], H. [illegible]

R.A.	19h [illegible] 2s		Prec. +	[illegible]
Decl.	[illegible]		— [illegible]	[illegible]

A cluster thus described in Sir J. Herschel's Catalogue of [illegible],— "[illegible]," which means—"a [illegible] cluster, pretty bright, large, round, very much and gradually brighter in the middle; the component stars range from the 11th to the [illegible] magnitude." Not in the small [illegible]. Ed.

1343. R CYGNI.

		h.	m.	s.			s.
R. A.		19	33	52	Prec.	+	1·61
		°	′				″
Decl.	N	49	57·0		——	N	7·99

A red and variable star, discovered to be variable by Pogson in 1852. The range of variability is from mag. 6 to 14, and the period 425^{d}. As regards colour—Schönfeld, "sehr roth;" Auwers, "violett;" Burton, 1876, "yellow." Birmingham adds:—"near it is an orange; 8; *p* 36^{s}, and 1′ + in Declination."

1344. 54 SAGITTARII. DCCV.

		h.	m.	s.			s.
R. A.		19	34	25	Prec.	+	3·44
		°	′				″
Decl.	S	16	32·6		——	N	8·03

		Position.	Distance.	Epoch.
		°	″	
MAIN	A B	*not given*	45·9	1861·73
BURNHAM	A B	41·7	45·5	1878·69
	A C	244·5	35·7	

A very delicate triple star in the space between the heads of Sagittarius and Capricorn; it is nearly 10° W. of β Capricorni, being the preceding member of a little triangle. A $5\frac{1}{2}$, yellow; B 8, violet; C [13], blue; there are several other small stars in the field, three of which, at nearly equal distances, form a line in the *sf* quadrant.

This fine object was discovered by Sir J. Herschel, but so small is C, that he termed it of the 18th magnitude. As however by gazing intently, in the best weather and under smooth clock motion, I caught it by glimpses, I assigned it a magnitude which I deem the *minimum visibile* of my telescope, [namely the 16th]. And it should be remembered, that such mere points of light were scrutinized to prove the power of the instrument for its general work, rather than to establish data for an epoch by estimation only.

1345. 2046 h. VULPECULÆ. (H. 4508; 𝕽.)

		h.	m.	s.			s.
R. A.		19	36	20	Prec.	+	2·46
		°	′				″
Decl.	N	26	33·2		——	N	8·19

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; p Ri; l C; st 10...15;" which means:—"a cluster; very large; pretty rich; not very compressed; the component stars range from the 10th to the 15th magnitudes."

1346. 2048 h. CYGNI. (H. 4511.)

	h.	m.	s.			s.
R. A.	**19**	**37**	**25**	Prec.	+	2·05
		°	′			″
Decl.	**N**	**39**	**56·1**	——	N	8·27

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vL; vRi; st 11...15 (Harding 1827);" which means:—"a cluster; very large; very rich; the component stars range from the 11th to the 15th magnitudes; this object was noticed by Harding of Lilienthal in 1827." Engraved, Rosse, *Dublin Trans.*, 1880, Pl. v. Fig. 4511. As seen at Parsonstown it is described as "a glorious cluster of stars from mag. 12 to mag. 15 *full of holes*."

1347. 241 P. XIX. AQUILÆ. (Σ. 2562.) DCCVII.

	h.	m.	s.			s.
R. A.	**19**	**37**	**26**	Prec.	+	2·89
		°	′			″
Decl.	**N**	**8**	**7·3**	——	N	8·27

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	252·5 ...	27·2 ...	1825·52
SMYTH	253·7 ...	26·8 ...	1833·78
MAIN	250·0 ...	26·7 ...	1864·76

A delicate double star, on the Eagle's back, preceding its *lucida* a little S. of the western parallel by about 2°. A 7½, pale topaz; B 9½, lilac. Piazzi first noticed its duplicity in these words, "Duplex. Comes 10ae magnit. 5″ ad austrum, 1·3″ temporis præcedit:" and the description is as accurately expressed as though compound stars were his object.

1348. 51 H. IV. SAGITTARII. (h. 2047; H. 4510; R.) DCCVI.

	h.	m.	s.			s.
R. A.	**19**	**37**	**45**	Prec.	+	3·39
		°	′			″
Decl.	**S**	**14**	**24·8**	——	N	8·29

A pale blue planetary nebula between the heads of Capricorn and the Archer; and about 2° distant from 54 Sagittarii, on a line N. by E., towards the Dolphin. This fine object is accompanied by several small stars, 4 of which form a square about it; and it is preceded at a little distance by a vertical row of telescopic stars. It was shown by Sir W. Herschel to M. De La Lande at Slough.

[Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 46; D'Arrest, *Dissertation*, Pl. ii. Fig. 3; Lamont, *Nebelflecken*, Pl. i. Fig. 2; Secchi, *Descrizione Osserv. Coll. Rom.*, Pl. iv. Fig. 1; D'Arrest, *Siderum Nebulosorum*, p. 336.]

1349. 2573 Σ. DRACONIS.

	h. m. s.		s.
R. A.	19 38 30	Prec.	+ 0·95
	° ′		″
Decl.	N 60 15·3	——	N 8·36

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	29·7	...	18·0	...	1832·12
Mädler	27·5	...	18·1	...	1853·38

A double star. A 6½, white; B 9, blue.

1350. 16 CYGNI. (Σ. 46 App. I.) DCCX.

	h. m. s.		s.
R. A.	19 38 54	Prec.	+ 1·61
	° ′		″
Decl.	N 50 16·2	——	N 8·39

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	135·2	...	37·5	...	1823·57
Main	135·3	...	37·7	...	1868·80
Jedrzejewicz	135·5	...	37·9	...	1877·65

A fine double star on the tip of the left or preceding wing, 10° to the N.W. of α Cygni, and within a degree to the E.N.E. of θ. A 6½, and B 7, both pale fawn-colour.

[Main in 1868 marked the magnitudes of A and B as both 4½. "Relatively fixed, but with common proper motion."—*Burnham.*]

1351. 250 P. XIX. AQUILÆ. (Σ. 2567.) DCCVIII.

	h. m. s.		s.
R. A.	19 38 56	Prec.	+ 2·81
	° ′		″
Decl.	N 12 6·7	——	N 8·39

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	315·7	...	18·07	...	1829·63
Smyth	312·0	...	20	...	1838·63

A very delicate double star on the upper or northern wing of Aquila, and 4° N. by W. of α, somewhat in the line formed from β to γ. A 8½, white; B 14, blue; other stars in the field. This excellent test-object, of course, will not bear the slightest illumination; the position is therefore by the spherical crystal micrometer, and the distance is precarious.

[Knott in 1862 found B to be of mag. 10. Struve's mags. are 7·7 and 9·5, of course in his scale, but those figures go far however to confirm Knott in supposing a serious error on Smyth's part.]

1352. 257 P. XIX. AQUILÆ. (Σ. 2570.) DCCIX.

		h.	m.	s.			s.
R. A.		19	39	44	Prec.	+	2·85
			°	′			″
Decl.	N		10	30·5	——	N	8·45

		Position. °	Distance. ″	Epoch.
Herschel, W.	A C	278·3	3·00 ±	1783·60
Struve, W.	A C	276·5	3·99	1825·56
Seabroke	A C	278·1	4·2	1873·59
Burnham	A B	147·6	0·29	1880·22

A delicate double star on the Eagle's back, and slightly *np* the bright star γ Aquilæ. A 8, white; C 10, smalt blue. [B was discovered by Alvan G. Clark in 1875 with a 12^{in} refractor.]

1353. γ AQUILÆ. DCCXI.

		h.	m.	s.			s.
R. A.		19	41	2	Prec.	+	2·85
			°	′			″
Decl.	N		10	20·7	——	N	8·55

	Position. °	Distance. ″	Epoch.
Burnham	258·0	132·9	1879·52

A *Nautical Almanac* star with a minute companion, on the bird's back, being the upper of the 3 well-known stars by which Aquila is distinguished, and which point towards Wega. A 3, pale orange; B 12, dusky; other small stars nearer. γ is usually designated Tarazed, from the Arabian *sháhín tárá-zed*, the soaring or star-striking falcon. By several direct comparisons in 1834 and 1836 I can pronounce that it is now actually brighter than β, which of course was not formerly the case. [The closest of the nearer stars is in Pos. 267°; Dist. 50″; Epoch 1877·67 (*Burnham*).]

1354. δ CYGNI. (Σ. 2579.) DCCXIV.

		h.	m.	s.			s.
R. A.		19	41	31	Prec.	+	1·87
			°	′			″
Decl.	N		44	51·7	——	N	8·60

	Position. °	Distance. ″	Epoch.
Herschel, W.	71·6	2·50	1783·72
Struve, W.	40·6	1·91	1826·55
Smyth	25·6	1·8	1842·56
Dawes	11·5	1·65	1851·51
Dembowski	355·5	1·58	1863·61
Dunér	343·7	1·53	1870·85
Burnham	332·6	1·40	1878·64

A most delicate double star in the middle of the left or preceding wing, 14° to the W. of α Cygni, on its parallel, and forming, with it and γ, a well-marked and nearly equilateral triangle. A 3½, pale yellow; B 9, sea-green. [Knott called B fine blue in 1865. One of the little stars which follow δ to the N. was found by Dawes in 1857 to be itself an exceedingly minute double.]

In 1802 and 1804 H̥. could no longer perceive the *comes*. In 1823 the star was perfectly round to H. and S., who saw no elongation, nor anything to give suspicion of a companion. In July, 1825, Sir J. South again examined it with his 7$^{\text{ft}}$ equatorial, at Passy, near Paris, in company with my late friend M. Gambart of Marseilles. Both agreed that it was perfectly round and sharply defined, appearing like a planetary disc, under a magnifying power of 787. Yet in the following year Σ. found it again double.

It was therefore presumed to have undergone an occultation in performing a periodic and elliptical revolution of about 40 years. Though neither the occultation nor the period of rotation can now be admitted, this presumption had the effect of delaying my attack. In 1837 I saw B plainly, a small green spot just on the edge of the brilliance of A, near its N. vertical, almost pointing in the direction of a little telescopic star in the *nf.* On my re-examination of it at Hartwell House, in 1842, it was certainly a much easier object to cope with.

[A considerable number of observations of this star having been accumulated, we now know a good deal more about its movements than could be known 40 years ago. There is no doubt that it is a binary of long period, but the precise period is uncertain. Behrmann's orbit, the most recent, puts it at 415$^{\text{y}}$, but this is much in excess of other results. Dunér finds that all the observations of angle agree fairly with theory, except Sir W. Herschel's, which is 36° out, which fact probably implies that a wrong quadrant was recorded. If for 18° 21′ *nf* we read 18° 21′ *sf*, "perfect agreement is produced."]

[Brodie remarks that this is a difficult object even with an 8½$^{\text{in}}$ refractor, and requires a fine state of atmosphere.]

1355. 276 P. XIX. CYGNI. (Σ. 2578.) DCCXII.

	h.	m.	s.			s.
R. A.	**19**	**41**	**37**	Prec.	+	2·20
		°	′			″
Decl.	**N**	**35**	**49·4**	——	N	8·60

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	125·5	...	14·1	...	1823·01
Smyth	126·5	...	15·0	...	1835·88
Main	125·7	...	14·7	...	1861·48

A neat double star preceding the Swan's neck, in the outer or W.

stream of the Galaxy, and about 10° N. by E. from β Cygni. A 8, and B 8½, both white, and there is a third star in the *sp* quadrant, about 2′ distant.

1356. 278 P. XIX. CYGNI. DCCXIII.

	h.	m.	s.		s.
R. A.	**19**	**41**	**44**	Prec. +	2·23
Decl.	**N 34°**	**44′·6**		—— N	8″·61

	Position.	Distance.	Epoch.
Herschel, W.	32°·9	35″·0	1783·73
South	29·2	38·7	1825·22
Main	28·6	36·9	1861·48
Dembowski	28·1	38·2	1874·10

A double star, close to the Swan's neck, in the preceding line of the Galaxy, and 9° to the N.N.E. of β. A 6, straw colour; B 8, smalt blue. This fine though wide object is nearly midway between two telescopic stars, lying just across the parallel in an *np* and *sf* line, and forming a lozenge with A and B. A slight retrograde angular change and an increase of distance may be inferred: but such a change is equally attributable to proper motion as to binary affection. Time will teach us the real truth. [Webb describes this as "very beautiful." 1¼° N. of χ.]

1357. 73 H IV. CYGNI. (h. 2050; H. 4514.) DCCXVI.

	h.	m.	s.		s.
R. A.	**19**	**41**	**56**	Prec. +	1·62
Decl.	**N 50°**	**14′·7**		—— N	8″·63

A very singular nebula on the tip of the Swan's preceding wing, closely following 16 Cygni, and 5½° N. of δ. There are several telescopic stars about it, and it is preceded by two which are double. In my telescope it is small, and somewhat resembles a star out of focus; but both the Herschels agreed, on viewing this object through their powerful instruments, that it appears to constitute a connecting link between the planetary nebulæ and the nebulous stars.

[Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 43; Secchi, *Descrizione Osserv. Coll. Rom.*, Pl. iv. Fig. 7.]

1358. χ CYGNI. (Σ. 2580.) DCCXV.

R.A.	$19^{h}\ 42^{m}\ 15^{s}$	Prec. +	$2^{s}{\cdot}27$
Decl.	N $33°\ 28'{\cdot}8$	—— N	$8''{\cdot}65$

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	73·3	...	25·5	...	1822·49
Smyth	72·9	...	25·7	...	1835·67
Dunér	71·9	...	25·7	...	1869·52
Jedrzejewicz	72·4	...	25·7	...	1876·97

A fine double star on the Swan's neck, in the Via Lactea, and $7\frac{1}{2}°$ distant from β in the Swan's bill, on a bearing N.N.E. A 5, golden yellow; B 9, pale blue; and there are numerous small stars in the field.

The results are singularly accordant; and it now remains to watch the effect of proper motions.

1359. 11 VULPECULÆ.

R.A.	$19^{h}\ 43^{m}\ 4^{s}$	Prec. +	$2^{s}{\cdot}44$
Decl.	N $27°\ 2'{\cdot}5$	—— N	$8''{\cdot}72$

The above is Hind's place, brought up from 1850, of the variable star observed by Anthelm in 1670. This object became visible in the month of June in that year, and seems to have brightened up and died away several times before finally being lost to view. At its maximum it equalled a star of the 3rd mag. (*Phil. Trans.*, vol. v. p. 2087 et seq.; vol. vi. p. 2197 et seq., 1671). In April, 1852, Hind examined carefully the locality in which the star was considered to have appeared, and found a small star of about mag. $10\frac{1}{2}$ within 2^{s} of R.A. and 0·2′ of Decl. On May 24, 1861, the same observer again examined the little star in question, and found that it had diminished to the 12th magnitude. This change of brightness, coupled with the almost precise identity of place, led him to conclude that he had really found Anthelm's new star so long reputed to have become extinct. He thought he noticed "a hazy ill-defined appearance about it which was not perceptible in other stars in the same field of view. Mr. Talmage, whose sight is remarkably strong, received the same impression ... Mr. Baxendell ... observed that no adjustment of the focus would bring the star up to a sharp point on the night of June 1."—(*Month. Not. R. A. S.*, vol. xxi. p. 232, June 14, 1861.)

1360. π AQUILÆ. (Σ. 2583.) DCCXVII.

	h. m. s.		s.
R. A.	19 43 31	Prec. +	2·82
Decl.	N 11° 32′·6	—— N	8″·75

	Position.	Distance.	Epoch.
Struve, W.	120°·7	1″·50	1829·9
Herschel, W.	124·4	1·40±	1783·65
Smyth	121·3	1·7	1836·81
Morton	120·8	1·49	1855·88
Doberck	119·9	1·27	1877·70

A close double star on the Eagle's northern wing, about 3° N. ½ W. from its lucida. A 6, pale white; B 7, greenish. This beautiful object may be termed a miniature of Castor.

1361. 8227 Lac. TELESCOPII.

	h. m. s.		s.
R. A.	19 43 54	Prec. +	4·83
Decl.	S 55° 14′·9	—— N	8″·79

	Position.	Distance.	Epoch.
Herschel, J.	150°·7	23″·0	1834·98

A double star. A 7, yellow; B 8, pale green.

1362. ζ SAGITTÆ. (Σ. 2585.) DCCXVIII.

	h. m. s.		s.
R. A.	19 44 6	Prec. +	2·66
Decl.	N 18° 52′·0	—— N	8″·80

		Position.	Distance.	Epoch.
Herschel, W.	A C	304°·2	8″·83	1781·88
Struve, W.	A C	309·5	8·77	1819·74
Herschel, J.	A C	318·5	9·81	1829·63
Smyth	A C	312·3	8·6	1838·67
Burnham	A B	157·6	0·29	1878·11
Burnham	A B	153·3	0·31	1880·21

A neat double star above the reed of the arrow, 9° S. by E. from β Cygni, and 10° N. of α Aquilæ. A 5, silvery white; C 9, blue, improving greatly under the red illumination. My measures, taken under every advantage, are decisive as to its fixity. [Alvan G. Clark discovered A to be a close double. Burnham remarks that no change has taken place in regard to A C.]

ζ Sagittæ is erroneously designated ξ in the Palermo Catalogue. The measures of the discoverer H. were corrected by his son, from the original papers.

Insignificant as this little asterism undoubtedly is, and there are few of even the modern ones more so, it is actually one of the old 48 constellated groups, and has held its station through the classic ages as Ὀϊστός, Τόξον, Sagitta, Telum, Jaculum, Arundo, Canna, and other names to the same purport. This constellation is placed between the bill of the Swan and the stars called the Family of Aquila, with its point towards the E., and its notch in the W. It was formerly about 4° in length, but the moderns have stretched it to upwards of 10°. Aratus is commonly said to have made Sagitta a part of Aquila; but Grotius shows this to be erroneous, and that the mistake is traceable to the Latin version of *Germanicus*. Certainly in the large celestial map which illustrates Morel's *Aratus* (1559), the bird and the arrow are distinctly separated. The components have been thus numbered:

Hyginus	4 stars.	Kepler	8 stars.
Ptolemy	5 „	Flamsteed . . .	18 „
Griemberger . .	7 „	Bode	34 „

ζ Sagittæ is closely preceded on the W. by 274 P. XX., a star of the 8½ magnitude. This was considered also to be double by one of my astronomical friends, but, after a very patient examination of it, I pronounce it single.

1363. χ² CYGNI. DCCXIX.

R. A.	19h 44m 38s	Prec. +	2s·29
Decl.	N 33° 9′·7	—— N	8″·84

		Position.	Distance.	Epoch.
		°	″	
SMYTH	A B	221	165	1836·60
	A C	172	238	

A variable star, with distant companions on the Swan's neck, and nearly 8° to the N.N.E. of β Cygni. A [4, red]; B 10, reddish; C 9, livid.

This extraordinary star has been mistaken for χ, a 5th magnitude star, which precedes, [and to obviate the repetition of this mistake Stone introduced the designation χ² for this variable. Webb points out that Smyth was in error in identifying it with 295 P. XIX., which is another object altogether]. Kirch, after watching it from 1686 to 1690, detected a regular variation from the 5th magnitude to invisibility, and made its period 404½d; and in this conclusion he was joined by

Maraldi, Cassini, and Le Gentil. Pigott found the star going through all its changes in 396d 21h. This object takes about 3½ months in increasing from its minimum to its maximum brightness, and in decreasing again; whence it may be regarded as invisible for 6 months; which tallies with Halley's observations with a "6ft tube, that bearing a very great aperture, discovers most minute stars."

This star has been greatly confounded with the neighbouring one, discovered by Jansen in 1600, in *pectore*, or rather in *eductione colli*, near γ, and considered as varying from the 3rd to the 10th magnitude. It will be recollected that this was the "nova" which called forth such remark about two centuries ago. These changes, however, are truly wonderful, "where," as Sir J. Herschel has well expressed it, "but for such evidences, we might conclude all to be lifeless."

[The period is now put at 406d, and the range from mag. 4 to 0, or invisibility.]

1364. α AQUILÆ. DCCXX.

		h.	m.	s.				s.
R. A.		19	45	24	Prec.		+	2·92
			°	′				″
Decl.	N		8	34·2	——		N	8·90

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	334·7	...	143·4	...	1781·56
STRUVE, W.	326·1	...	153·7	...	1821·85
SMYTH	323·1	...	152·6	...	1834·81
STRUVE, O.	318·5	...	153·3	...	1851·81
FLAMMARION	311·9	...	156·1	...	1877·82

A *Nautical Almanac* star with a distant companion, at the foot of the Eagle's neck. A 1½, pale yellow; B 10, violet tint. [Burnham states that there are more than a dozen small stars nearer than B. He has measured many of them.]

The results indicate a retrograde angular movement and an increase of distance. The orbital change here shown is amenable to the occult movement in space termed proper motion, the detected value of which, in the large star, is so sensible, that the investigations of Piazzi, Baily, and Argelander yield results which are almost identical, both in amount and direction. Argelander's are:—in R.A., + 0·56″; in Decl., + 0·39″. It will be for time to show whether the *comes* is also following in the same direction with equal, or even more rapidity than A. It should, therefore, be sedulously watched, although its minuteness renders it of difficult vision under illumination. Bradley's measures compared with recent measures show the movement of both to be in the same direction;

but there can be little doubt that the changes noted are due to proper motion only.

Aquila is in that part of the Milky Way which is just below Lyra, and a line drawn from Arcturus, through the head of Hercules, reaches three stars in a diagonal line,—β, α, and γ,—pointing N.N.W. towards α Lyræ and the Dragon's head beyond the Lyre: these three are designated the Family of Aquila, and have been (*mirabile dictu*) mistaken, by rather green hands, for Orion's belt. The brackish rhymes further tell us:

In Via Lactea's beauteous stream beneath the Swan and Lyre,
See where Jove's Eagle soars on high, the type of strength and fire;
And mark the triangle in which his lucida partakes,
Which form, if join'd with Deneb's beams and Wega bright, it makes.

'Αετός, Aquila, Jovis Ales, Armiger Jovis, Vultur volans, Eagle and Flying Grype, have been the several designations of this asterism with our astronomers; by the Arabians it was called *El-'oḳáb*, the eagle, and *El-nesr el-ṭáïr*, the flying eagle, whence α Aquilæ is generally known as Altair. It is one of the old Catasterisms of Hipparchus; and Dupuis very fancifully thought the name was given when the constellation was near the summer solstice, and that the bird of highest flight was chosen to express the greatest elevation of the Sun. The components of Aquila and Antinoüs are usually thrown together in catalogues; and they have been thus numbered:

Ptolemy . . .	15 stars.	Hevelius	42 stars.
Tycho Brahé . .	19 „	Flamsteed . . .	71 „
Bayer	32 „	Bode	276 „

1365. 180 B. AQUILÆ. (Σ. 2587.)

R. A.	19h 45m 57s	Prec.	+ 2·99s
Decl.	N 3° 48′·8	——	N 8″·94

	Position.		Distance.		Epoch.
Struve, W.	98°·5	...	4″·0	...	1828·08
Dunér	100·5	...	4·1	...	1871·76

A double star. A 7, golden; B 10.

1366. 2053 h. DRACONIS. (H. 4517.)

R. A.	19h 46m 16s	Prec.	+ 1·07s
Decl.	N 59° 8′·5	——	N 8″·97

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—

"Cl; vL; lC; st 7;" which means:—"a cluster; very large; not very compressed; it includes stars of the 7th magnitude."

1367. 9 H. VII. VULPECULA. (h. 2052; H. 4516; 𝔐.)

	h.	m.	s.			s.
R. A.	**19**	**46**	**21**	Prec.	+	2·57
		°	′			″
Decl.	**N**	**22**	**48·7**	——	N	8·97

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; pRi; pC; st 11...12;" which means:—"a cluster; large; pretty rich; pretty compressed; the component stars are chiefly of the 11th and 12th magnitudes."

1368. 307 P. XIX. AQUILÆ. (Σ. 2590.) DCCXXI.

	h.	m.	s.			s.
R. A.	**19**	**47**	**1**	Prec.	+	2·86
		°	′			″
Decl.	**N**	**10**	**4·1**	——	N	9·03

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	306·5	...	12·0 ±	...	1781·56
STRUVE, W.	309·2	...	13·5	...	1830·5
MÄDLER	309·7	...	14·2	...	1843·70

A very delicate double star on the upper or northern shoulder of the bird, and about 1½° to the N. of *a*. A 7, lucid white; B 13, blue; there is also a star of the 10th magnitude at a distance in the *sp* quadrant, and another still smaller follows nearly on the parallel, the whole forming a pretty object.

As this double star was well seen under an interposed achromatic lens, then just completed for me by Mr. Dollond, I applied that simple increase of power to its measures. The adaptation consists of a concave lens which is fixed to an adapter tube, and introduced into the ocular focus of the telescope, where it adds little to the weight, and but four inches to the length of the instrument. This doubles the value of the magnifying power used, diminishes the magnitude of the spider lines, and seems to flatten the whole field of view; and these advantages are gained without any serious loss of light. In the present instance the object is so delicate that, without such aid, it could have been merely estimated; but with an eye-piece magnifying 118 times, = 236, and the telescope driven by the equatorial clock, the Position was of comparatively easy measurement.

1369. 320 P. XIX. VULPECULÆ. (Σ. 48 App. I.) DCCXXIV.

	h. m. s.		s.
R. A.	**19 48 31**	Prec. +	2·64
	° ′		″
Decl.	**N 20 3·0**	—— N	9·15

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	148·5	...	42·4	...	1823·63
Struve, W.	147·9	...	42·2	...	1831·8
Bellamy	147·5	...	42·3	...	1875·64

A wide double star between the Fox and the Arrow, in the following stream of the Milky Way, and 11½° N. of α Aquilæ. A and B, both 7, and both white. All the measures indicate relative fixity.

Away in the *sp* quadrant is a triple star, the members of which are nearly in a line *sp* and *nf* across the parallel, of the 10th, 11th, and 13th magnitudes. There form 105 Ⱨ. III., but the discoverer, as well as Σ., only noted two of them; and in the Dorpat Catalogue of 1837 they are jointly marked No. 2595, *rej.*

1370. ε DRACONIS. (Σ. 2603) DCCXXVII.

	h. m. s.		s.
R. A.	**19 48 32**	Prec. —	0·17
	° ′		″
Decl.	**N 69 59·2**	—— N	9·15

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	333·2	...	2·5	...	1780·76
Dawes	354·0	...	3·10	...	1830·60
Smyth	356·3	...	3·0	...	1846·77
Main	353·1	...	2·65	...	1861·82
Doberck	359·8	...	2·89	...	1876·61
Stone, O.	1·3	...	2·81	...	1878·81

A fine double star in the *nf* flexure of Draco's back. A 5½, light yellow; B 9½, blue; and there is a third star at a little distance to the north of A.

[A change of angle seems probable. Gledhill says, "Is B variable?" Webb seems to think it is.]

Though H. and S. rate the *comes* of this star as only of the 10th magnitude, it seems to have given them no small trouble, for they remark that it was "even uncertain whether the small star had really been seen at all." In my instrument it bears pretty full illumination, yet the inflection, from disparity of brilliance, rendered the measures rather ticklish. ε Draconis is on the preceding parallel of β Cephei; and it constitutes the N.W. angle of the square formed by δ, π, ρ, and ε.

1371. 57 AQUILÆ. (Σ. 2594.) DCCXXIII.

		h.	m.	s.			s.
R. A.		19	48	40	Prec.	+	3·25
			°	′			″
Decl.		S	8	30·8	——	N	9·16

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	171·8	...	36·2	...	1821·79
SMYTH	171·5	...	35·4	...	1834·63
BELLAMY	170·2	...	35·7	...	1875·68
BURNHAM	171·1	...	35·6	...	1880·74

A fine double star in the bow of Antinous. A 6½, and B 7, both blue. This follows closely 56 Aquilæ (also double, mags. 6 and 12, dist. 43″). My measures seem by comparison with previous ones to decide the disputed question of the star's fixity.

[Webb notes "colours entirely different;" and suggests that the colours should be watched.]

1372. 71 M. SAGITTÆ. (h. 2056; H. 4520.) DCCXXV.

		h.	m.	s.			s.
R. A.		19	48	49	Prec.	+	2·67
			°	′			″
Decl.		N	18	29·6	——	N	9·17

A rich compressed Milky-Way cluster on the shaft of the arrow, and 10° N. ¼ E. from α Aquilæ. It was discovered by Mechain in 1781, and described by Messier as a nebula unaccompanied by stars, and of a very feeble light. Piazzi seems to have observed it meridionally as a star of the 8th magnitude, by admitting the light of a lamp upon it (312 P. XIX.), but his darkened field ought to have shown that it is flanked by four telescopic stars, besides other larger companions in view. It was first resolved by Sir W. Herschel in 1783, who esteemed its profundity to be of the 243rd order.

1373. 191 B. AQUILÆ. (Σ. 2597.)

		h.	m.	s.			s.
R. A.		19	49	25	Prec.	+	3·22
			°	′			″
Decl.		S	7	0·9	——	N	9·22

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	92·1	...	1·92	...	1826·47
SECCHI	87·9	...	1·67	...	1856·4
BURNHAM	88·6	...	1·23	...	1880·77

A double star. A 7½, white; B 8½, white.

1374. β AQUILÆ. (O. Σ. 532.) DCCXXVI.

		h.	m.	s.			s.
R. A.		19	49	54	Prec.	+	2·94
		°	′				″
Decl.	N	6	8·3		——	N	9·25

		Position.	Distance.	Epoch.
		°	″	
BURNHAM	AB	15·7	11·7	1880·06
	AC	347·2	151·7	1879·37

A *Nautical Almanac* star, with companions, in the Eagle's neck, 2½° to the S.S.E. of *α*, and the lowest of the Family of Aquila. A 3½, pale orange; C 10, pale grey; with 2 other small stars following, besides the 4 preceding ones mentioned by Piazzi.

This star appears in many catalogues as Alshain, *i.e. al-sháhín*, the falcon, which, though used as an Arabic word, is Persian: with many others, it was transplanted under the Khalifs. It is not now so bright as γ or δ, which could not have been the case in Mayer's time. Ptolemy marked it γ in brightness, as did also Tycho Brahé, Bradley, and La Caille; but Flamsteed, Piazzi, and Zach rate it 3½, though Hevelius could enter it as no larger than the 4th magnitude.

1375. ψ CYGNI. (Σ. 2605.) DCCXXVIII.

		h.	m.	s.			s.
R. A.		19	52	47	Prec.	+	1·57
		°	′				″
Decl.	N	52	8·8		——	N	9·48

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	180·5	4·0 ±	1779·84
STRUVE, W.	184·6	3·32	1831·39
SMYTH	184·2	3·5	1837·53

A fine double star, in the space between the tip of the Swan's preceding wing and the tail, being the middle one of 3 stars about 10° N.N.W. of *α* Cygni. A 5½, bright white; B 8, lilac. From H̥. having registered the acolyte in a wrong quadrant, there appeared to have been a great change in the angle of this pretty object, but H. on reference to his father's MS. altered the *np* to *sp*, which made an alteration of 180° by a *coup de plume*.

1376. 116 B. CYGNI. (Σ. 2607.)

		h.	m.	s.			s.
R. A.		19	54	13	Prec.	+	2·01
		°	′				″
Decl.	N	41	57·5		——	N	9·59

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	A C 293·4	3·22	1831·52
Struve, O.	A B 330·0	0·50	1842·67
	A C 292·0	3·29	
Struve, O.	A B 316·6	0·38	1851·62
	A C 289·6	3·07	
Struve, O.	A B 318·0	0·53	1858·59
	A C 290·9	3·41	
Burnham	A B 317·0	0·31	1878·53
	A C 298·2	3·32	

A star originally observed by W. Struve as a double, but made triple by O. Struve (=O. Σ. 392). A 8, white; B 9½; C 10, ash. The angle of A B has clearly diminished, but A C appears unchanged.

1377. 27 M. VULPECULÆ. (h. 2060; H. 4532; ℌ.) DCCXXIX.

	h.	m.	s.			s.
R. A.	**19**	**54**	**48**	Prec.	+	2·59
	°	′				″
Decl.	**N 22**	**25·0**		——	N	9·63

This is the double-headed shot or "dumb-bell nebula," on the Fox's breast, close to 14 Vulpeculæ; about 7° S.E. of β Cygni, and nearly half-way between it and the Dolphin. This magnificent and singular object is situated in a crowded vicinity, where field after field is very rich. It was discovered in 1764, and described by Messier as an oval nebula without a star. My instrument, however, shows several, of which three, lying *sp* and *nf*, nearly in the same direction with the dumb-bell, and 26ˢ distant, following, are sufficiently remarkable: the two largest are of the 8 and 9½ magnitudes, and 6ˢ apart, on an < = 73°, the latter having a small reddish telescopic companion *nf*.

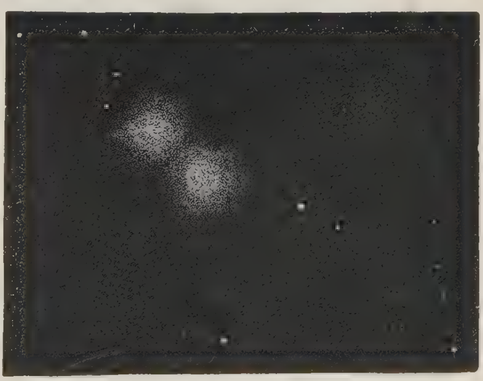

Fig. 44. 27 M. Vulpeculæ.

27 M. is truly one of those splendid enigmas which, according to Ricciolus, are proposed by God, but never to be subject to human solution. As the axis of symmetry, or line through the centres of the principal masses, is not less in apparent diameter than 5′, the vastness of its extent is as utterly inconceivable as the dynamical maintenance of its form. Although ℌ. could only bring it to a mottled nebulosity, yet, from some accidental stars, he considered it resolveable: he also

concluded it to be a double nebula, each with a seeming nucleus, with their apparent luminiferous matter running into each other. But Sir J. Herschel saw and figured a feature which had been overlooked, and which entirely altered the views of its physical constitution. This is "the faint luminosity which fills in the lateral concavities of the body, and converts them, in fact, into protuberances, so as to render the general outline of the whole nebula a regular ellipse, having for its shorter axis the common axis of the two bright masses of which the body consists, that is to say, the *longer* axis of the oval form under which it was imperfectly seen by Messier." The subjoined sketch (p. 585), showing it as seen in my telescope, is of course without this "filling in."

The late Earl of Rosse applied his powerful reflector to this wondrous object. It bore very high magnifying powers, and though his lordship would not assert that it was actually resolveable, "in the absence of that complete re-solution which leaves no room for error," very evident symptoms of resolveability were shown. [The 6ft Rosse reflector surrounds it with an external ring like a chemical retort.] The direction of the axis of symmetry through this dense agglomeration of stars is at an angle with the meridian = 32°.

[Engraved, *Phil. Trans.*, 1833, Pl. ii. Fig. 26; *Phil. Trans.*, 1844, Pl. xix. Fig. 26; *Phil. Trans.*, 1850, Pl. xxxviii. Fig. 17; *Phil. Trans.*, 1861, Pl. xxxi. Fig. 43; D'Arrest, *Dissertation*, 1861, Pl. ii. Fig. 8; Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. ix. Fig. 35; Secchi, *Descrizione Osserv. Coll. Rom.*, Pl. iv. Fig. 10; D'Arrest, *Siderum Nebulosorum*, p. 338.]

1378. χ SAGITTÆ.

	h.	m.	s.				s.
R.A.	**19**	**55**	**5**	Prec.	+		2·71
	°	′					″
Decl.	**N 17**	**13·0**		——		N	9·65

A 6th mag. orange star mentioned by Webb as the *lucida* or brightest object of a beautiful group containing a smaller very red star, and a pretty little 10 mag. pair. Burnham points out that this pair seems to be 100 H. IV., whereof Sir W. Herschel gives:—Pos. 259°; Dist. 23″; Epoch 1783·6.

1379. 6780 Brisb. PAVONIS. (*h. 5163.)

	h.	m.	s.				s.
R.A.	**19**	**55**	**15**	Prec.	+		5·45
	°	′					″
Decl.	**S 63**	**22·1**		——		N	9·67

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	248·5 ...	$1\frac{1}{2}$ *est.* ...	1836·44

A double star. A $7\frac{1}{2}$; B $8\frac{1}{2}$.

1380. 2616 Σ. AQUILÆ.

		h.	m.	s.			s.
R. A.		19	57	41	Prec.	+	2·78
		°	′				″
Decl.	N	14	16·7		——	N	9·86

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	265·9	3·2	1829·69

A double star. A 7½, very yellow; B 10½.

1381. 75 M. SAGITTARII. (h. 3064; H. 4543.) DCCXXX.

		h.	m.	s.			s.
R. A.		19	59	35	Prec.	+	3·55
		°	′				″
Decl.	S	22	13·8		——	N	10·01

A globular cluster in the space between the left arm of Sagittarius and the head of Capricorn, and 7½° S.S.W. of β Capricorni. It is a lucid white mass among some glimpse stars, with a large one in the *nf* verge of the field. It was discovered by Mechain in 1780, who considered it to be a nebula without a star; but Messier viewed it as a mass of very small stars, which opinion, on an object which at best is rather faint, was bold. In 1784 it was resolved in Sir W. Herschel's 20ft Newtonian, and, on being gauged, was assigned a profundity of the 734th order. No wonder that this miniature of 3 M. (No. 928) should be pale to the gaze.

1382. 59 H. VII. CYGNI. (h. 2066; H. 4544.)

		h.	m.	s.			s.
R. A.		20	0	9	Prec.	+	1·96
		°	′				″
Decl.	N	43	41·2		——	N	10·04

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; v Ri; c C;" which means:—"a cluster; large; very rich; considerably condensed."

1383. 396 P. XIX. CAPRICORNI. (Σ. 2625.) DCCXXXI.

		h.	m.	s.			s.
R. A.		20	0	38	Prec.	+	3·35
		°	′				″
Decl.	S	13	14·5		——	N	10·08

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	16·2	14·1	1782·68
Struve, W.	11·3	13·3	1827·67
Smyth	13·0	15·0	1838·56
Barclay	12·4	12·3	1865·00

A delicate double star near the tip of Capricorn's left horn, which precedes *α* Capricorni by about 3° on the W. parallel. A 8½, pale yellow; B 14, blue; and there are many glimpse companions in the field. This object, though seen very distinctly in my instrument, is so troubled with variable refractions, that even the estimation I attempted was an affair of difficulty.

1384. 3814 h. TELESCOPII. (H. 4546.)

	h.	m.	s.		s.
R. A.	20	1	52	Prec. +	4·38
		°	′		″
Decl.	S	48	41·4	—— N	10·17

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; S; R; p g v m b M;" which means:—"very bright; small; round; pretty gradually very much brighter in the middle."

1385. 415 P. XIX. VULPECULÆ. (Σ. 2631.) DCCXXXII.

	h.	m.	s.		s.
R. A.	20	2	23	Prec. +	2·63
		°	′		″
Decl.	N	20	47·1	—— N	10·20

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	340·4	4·4	1832·95
Smyth	340·5	4·5	1838·70
Secchi	338·6	4·5	1857·15
Main	336·4	4·5	1861·77
Wilson and Seabroke	341·2	4·7	1875·71

A delicate double star, close to the arrow under the Fox's shoulder. A 8, pale white; B 10, sky-blue. This is one of those classed by Struve as "acervi," but it is in rather a fine galaxy splash of stars than a cluster. It is to be found midway between *β* Cygni and *α* Delphini, and nearly a degree *p θ* Sagittæ, a 7th mag. star.

["Vi è qualche moto probabile."—*Secchi.*]

1386. 227 B. AQUILÆ. (Σ. 2628.)

	h.	m.	s.		s.
R. A.	20	2	32	Prec. +	2·89
		°	′		″
Decl.	N	9	5·1	—— N	10·22

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	348·9	4·4	1830·58
Main	339·5	4·3	1863·73
Dunér	345·8	4·2	1868·43

A double star. A 6, yellowish white; B 9, purple.

1387. 30 P. XX. DRACONIS. (Σ. 2642.) DCCXXXVI.

		h.	m.	s.			s.
R. A.		**20**	**4**	**3**	Prec.	+	0·79
		°	′				″
Decl.	**N**	**63**	**22·7**		——	N	10·33

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	165·2	...	2·45	...	1832·50
Struve, O.	168·5	...	2·33	...	1851·9

A close double star between the Dragon's back and the elbow of Cepheus; it is 16° W. by N. of α Cephei, and about one-third of the distance between 64 and 66 Draconis. A and B, both 9, and both pale white. [In the field with this, and 4′ to the N., is another pair (=β 470), of which Dembowski gives:—Pos. 213°; Dist. 2.3″; Epoch 1876·8].

1388. 2 P. XX. AQUILÆ. (Σ. 2634.) DCCXXXIII.

		h.	m.	s.			s.
R. A.		**20**	**4**	**33**	Prec.	+	2·73
		°	′				″
Decl.	**N**	**16**	**28·4**		——	N	10·37

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	17·0	...	4·50 ±	...	1782·85
Struve, W.	13·7	...	6·43	...	1830·12
Smyth	13·2	...	5·9	...	1838·58
Secchi	13·5	...	5·89	...	1857·10

A delicate double star, hooked into the Eagle's boundary near the shaft of the arrow, and 10° N.N.E. of Altair. A 7, pale topaz; B 10, lucid blue: they are in a splendid vicinity, and in the *sf* is the star mentioned by Piazzi, "25″ temporis aliæ 8^{ae} magnitud. sequitur 5′ circiter ad austrum."

The results imply orbital motion, but the star is too difficult of measurement for an absolute opinion yet. [Secchi however says "Fissa."] The colours here assigned are under high magnifying powers, fine atmosphere, and easy motion; yet Ħ. has said, "large, red; small, a deeper red." Now, whether Sir William's bias for red tints was as much owing to his mirror-metal as to a peculiarity of vision, his observations afford proof that the singularity was not at all accompanied by any defect of vision. Indeed sharp-sightedness might be termed an attribute of Ħ. These seemingly opposed qualities, however, are not incompatible with each other.

1389. θ SAGITTÆ. (Σ. 2637.) DCCXXXIV.

	h. m. s.		s.
R. A.	20 5 5	Prec. +	2·64
	° ′		″
Decl.	N 20 35·2	—— N	10·41

		Position.		Distance.		Epoch.
		°		″		
Smyth	A B	327·1	...	11·4	...	1834·77
	A C	226·6	...	70·1		
Main	A B	328·5	...	11·5	...	1875·65
	A C	224·7	...	74·73		
Jedrzejewicz	A B	327·5	...	11·5	...	1877·19
	A C	224·8	...	76·4		

A triple star near the head of the Arrow, and nearly in mid-distance between β Cygni and α Delphini. A 7, pale topaz; B 9, grey; C 8, pearly yellow. Piazzi saw the duplicity of A, but the *comes* must have appeared smaller than of the 9th magnitude, for he says, "Duplex. Comes vix pene visibilis, $0{\cdot}2^{s}$ temporis, 5″ ad boream præcedit."

["Probable increase of distance in AB: certain increase in AC. The proper motion of A is probably the cause of these changes."—*Gledhill.*]

A and C point in the direction of another star in the *sp* quadrant, at about the same distance; and A is followed on the parallel by a wide double star, in a fine field.

1390. 12 P. XX. ANTINOI. DCCXXXV.

	h. m. s.		s.
R. A.	20 5 35	Prec. +	3·08
	° ′		″
Decl.	S 0 29·1	—— N	10·44

	Position.		Distance.		Epoch.
	°		″		
South	202·1	...	54·6	...	1825·01
Stone, O.	204·5	...	55·3	...	1879·60

A wide double star on the youth's arm, 7½° to the S.S.E. of β Aquilæ, and 1° N. of θ Antinoi, a star of the 3½ magnitude. A 8, and B 9, both pale grey; there are several small stars in the field. A comparison of all the measures shows that it must be merely an optical double.

1391. 26 P. XX. ANTINOI. (Σ. 2644.) DCCXXXVII.

	h. m. s.		s.
R. A.	20 6 58	Prec. +	3·06
	° ′		″
Decl.	N 0 32·3	—— N	10·55

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	213·8	3·00 ±	1783·70
Struve, W.	208·1	3·86	1821·82
Smyth	207·9	3·5	1832·80
Smyth	210·2	3·5	1847·60
Seabroke	206·7	3·4	1873·62
Jedrzejewicz	207·9	3·6	1879·75

A fine double star on the left arm of Antinous, and nearly 2° N. of θ, a little *f* and S.E. of β Aquilæ. A 6½, and B 7, both white. [“Bluish white.”—*Knott.*]

1392. 20 Ħ. VIII CYGNI. (h. 2071; H. 4559; R.)

	h.	m.	s.			s.
R. A.	20	7	22	Prec.	+	2·51
	°	′				″
Decl. N	28	9·6		——	N	10·58

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—“Cl; v B; v L; Ri; l C; st 6 . . . 11;” which means:—“a cluster; very bright; very large; rich; not very compressed; the component stars range from the 6th to the 11th magnitudes.”

1393. 43 P. XX. AQUILÆ. DCCXXXVIII.

	h.	m.	s.			s.
R. A.	20	8	46	Prec.	+	2·95
	°	′				″
Decl. N	6	14·8		——	N	10·68

	Position.	Distance.	Epoch.
	°	″	
South	192·8	43·8	1824·67
Smyth	11·7	43·6	1833·70
Main	13·8	45·1	1861·77
Dembowski	192·9	43·3	1874·0

An open double star on the Eagle's beak, 4½° due E. of β Aquilæ. A and B, both 6½, and both lucid white; and there is a coarse pair in the *sf* quadrant, somewhat resembling this, but the components are smaller.

[Webb found the S. or preceding star to be smaller in 1850, and Knott the same in 1862. Dembowski gave 6·8 and 7·2.]

1394. 2654 Σ. ANTINOI.

	h.	m.	s.			s.
R. A.	20	9	24	Prec.	+	3·15
	°	′				″
Decl. S	3	50·4		——	N	10·73

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	233·9	13·9	1831·44
Main	231·6	14·0	1863·72
Jedrzejewicz	234·2	11·8	1877·01

A double star. A 6½, white; B 7½, white. Webb suggests “yellow; blue.” Main, “yellowish and pale blue.”

1395. o^2 CYGNI. (Σ. 50 App. I.) DCCXXXIX.

R.A.	**20h 10m 10s**	Prec. +	1s·89
Decl.	**N 46° 24'·5**	—— N	10"·78

		Position.	Distance.	Epoch.
Struve, W.	A D	323°·7	337"·8	1835·95
Struve, W.	A C	174·0	106·8	1836·18
Main	A C	173·2	106·9	1866·48
	A D	323·5	338·0	
Jedrzejewicz	A C	173·5	106·8	1879·26
	A D	323·2	337·8	

A wide quadruple object in a rich field on the Swan's left thigh, about 8° W. by N. of α Cygni, and forming the vertex of a low isosceles triangle with that lucida and δ Cygni. A 4, orange; B 16, livid; C 7½, and D 5½, both cerulean blue: these colours were closely attended to, and the latter noted when the large star was hidden by the flat bar of the eyepiece magnifying 157 times, so that Struve's idea, that they are not the effect of contrast, is supported. B is a most minute point of light, to which Sir J. Herschel drew my attention as a severe test which had escaped his father's gaze: it is, of course, far too delicate for metrical observation with my means, but its angle is not difficult to estimate, as it lies nearly on the line to D, which is o^1 Cygni.

1396. 545 Birm. CAPRICORNI.

R.A.	**20h 10m 40s**	Prec. +	3s·52
Decl.	**S 21° 39'·3**	—— N	10"·82

A red star of the 7th magnitude. Sir J. Herschel at the Cape described this object as:—"Pure ruby, perhaps the finest of my ruby stars." Lalande, "rouge," 7½; Secchi, "rossa cupa," 7½–8; Webb, "Decided but not very deep ruby," 6; Birmingham, 1876, "Red," 7½.

1397. α^2 CAPRICORNI. (Σ. 51 App. I.) DCCXL.

R.A.	**20h 11m 57s**	Prec. +	3s·33
Decl.	**S 12° 53'·1**	—— N	10"·92

α^2 CAPRICORNI.

		Position.		Distance.		Epoch.
		°		″		
BURNHAM	AB	150·2	...	7·41	...	1878·54
	BC	59·2	...	1·16	...	1880·59
	AD	156·2	...	154·4	...	1879·44

α^1 CAPRICORNI.

		Position.		Distance.		Epoch.
		°		″		
BURNHAM	AB	221·1	...	44·3	...	1879·49
HOLDEN	AC	181·8	...	40 ±	...	1874·6

α^2 and α^1 CAPRICORNI.

	Position.		Distance.		Epoch.
	°		″		
JEDRZEJEWICZ	291·1	...	376·1	...	1877·69

A *Nautical Almanac* star and multiple object, at the tip of Capricorn's right horn. Of the group forming α^2, A is 3, pale yellow; B 11; C 11; D $9\frac{1}{2}$: of α^1, A is 4, yellow; B 9; C 14. Here the principal objects form Prima and Secunda Giedi of the Catalogues, from *al-jedí*, the goat; and they present a fine double star to the naked eye, if a very good one. The telescope, however, shows it to be multiple; but it requires an instrument of no small power to reveal the companions. [The duplicity of B of α^2 was discovered by Alvan Clark in 1862 with the Chicago $18\frac{1}{2}^{in}$ refractor. The faint companion C of α^1 was detected by Burnham with the 26^{in} Washington refractor.] The star B of α^2 is one of those to which Sir John Herschel called the attention of astronomers, as probably shining by reflected light. The determination of this interesting fact would indeed be a triumphant achievement.

The micrometrical measures of the two principal stars are in such accordance as to attest relative fixity.

Αἰγόκερως, Ægoceros, Πάν, Pan, Αἴγιπαν, Ægipan, and Capricornus have been the most general names of Capricorn; but it appears in the Arabo-Latin *Almagest* as Alcaucurus, and elsewhere as *Al-jedí*, the goat. It is usually termed the Xth sign in zodiacal order, and the IVth of the Southern signs; being one of the old 48 asterisms which the Greeks are supposed to have received from the Egyptians. As a mere quadruped, it was considered to be in honour of Amalthæa, though she was already deified as Capella; but its fanciful compound form was held to commemorate Pan's leap into the Nile, in a *pan*-ic at Typhon's approach, whereby his hind-quarters became fishified. The early Venetian illustrations of Hyginus represent this singular portion with an overhand knot in it; but a fine old geographical MS. on vellum, in the Archbishop of Canterbury's library at Lambeth, of an unknown date, but belonging to Robert Hare in 1564, figures it as a goat: as it also is in

Albumazar's *Introductorium in Astronomiam.* Postellus seizes upon such representations to claim the sign for the scape-goat in Leviticus; but he was also pleased to consider Pisces as representing the fishes with which the multitude were miraculously fed. Macrobius had long before advertised, that as the sun approached this sign, he quitted his lower course, and ascended more and more, wherefore the figure of a goat was chosen to represent it, because that animal is addicted to climbing the sides of mountains.

Although Capricorn is not a striking object, it has been the very pet of all constellations with astrologers, having been the fortunate sign under which Augustus and Vespasian were born, who thereby were entitled to the tutelage of Vesta: and this Sabæan superstition was honoured by medals, marbles, poems, and what not.

The astrologers of the Middle Ages of course adopted this sign in all its importance; nor were they long in discovering, that as the deluge was owing [?] to a conjunction of all the planets in Capricorn, so would the great conflagration be occasioned by their conjunction in Cancer. The MS. Almanac for 1386 assures us that "whoso is borne in Capcorn schal be ryche and wel lufyd."

As a counterpoise to the general impression in favour of Capricorn, Ovid, in making Acætes qualify for a sailor, is supposed by some to give it an unfavourable aspect. But though Ovid had no great cause to honour the nativity-star of Augustus, he certainly meant the Hædi in the following lines:

Oleniæ sidus pluviale *Capellæ*,
*Taygetem*que, *Hyadas*que oculis, *Arctum*que notavi.

The ancients accounted Capricorn the Xth sign, and when the Sun arrived thereat, it made the winter solstice, with regard to our hemisphere; but the stars having advanced a whole sign towards the E., Capricorn is now rather the XIth sign; and it is at the Sun's entry into Sagittarius that the solstice occurs, though the ancient manner of speaking is still retained. To identify the asterism, direct a line from α Lyræ to α Aquilæ, and continue it 23° into the S.S.E., and it will pass between α and β in the head of Capricorn:

A startling monster's hybrid form your eyes will there assail,
That sign so often dubb'd the Goat, yet with a fish's tail;
And though its figure is not large, it brightly still doth glow,
Its stars within the outline placed, no *amorphotæ* know.

Sir W. Herschel has tabulated the lustre and magnitude of the stars in Capricorn, in the *Philosophical Transactions*, 1796; and they have been thus successively numbered:

Ptolemy	28 stars.	Hevelius	30 stars.
Tycho Brahé . .	28 „	Flamsteed . . .	51 „
Copernicus . . .	29 „	Bode	154 „

1398. κ CEPHEI. (Σ. 2675.) DCCXLIII.

		h.	m.	s.			s.
R. A.		**20**	**12**	**35**	Prec.	−	1·78
		°	′				″
Decl.	**N**	**77**	**22·7**		——	N	10·97

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	126·2	7·1	1820·18
Smyth	123·8	7·5	1838·83
Wilson and Seabroke	123·5	7·3	1873·73
Stone, O.	124·2	7·2	1878·81

A neat double star on the instep of the left foot, and about half-way from β Cephei to ε Ursæ Minoris, the inner star of the tail. A $4\frac{1}{2}$, bright white; B $8\frac{1}{2}$, smalt blue, colours beautifully shown. This fine object exhibited promise of binarity when I took it hand. I was, therefore, disappointed on finding my results were altogether in favour of the fixity of the components.

My attention was drawn to the mean apparent place of this star by Baily, who found a serious difference in the R.A. of Piazzi's first and second Catalogues; my transit instrument soon showed that the value in the first was the correct one. This star and γ, though Ptolemy expresses ποδός to both, are very absurdly placed upon the knees of Cepheus in some recent maps and globes, and one foot upon the Little Bear's back. The figure is properly drawn upon the large S.D.U.K. Maps; but these Maps, though the best which have appeared, have not been accepted as a standard, but, with Baily's reformed boundaries, they ought to be made the authority. [This remark as to those Maps is still true in 1881. They certainly are the best in use, albeit many years out of date as regards precession.]

1399. σ CAPRICORNI. DCCXLI.

		h.	m.	s.			s.
R. A.		**20**	**13**	**3**	Prec.	+	3·47
		°	′				″
Decl.	**S**	**19**	**27·8**		——	N	10·98

	Position.	Distance.	Epoch.
	°	″	
Herschel, W.	175·2	50·1	1783·
Smyth	176·8	54·1	1837·61

A wide double star on the animal's *os frontis*, and rather more than 4° to the S. of β. A $5\frac{1}{2}$, yellow; B 10, violet: there are several distant stars in the *nf.* This object seems to have been relatively stationary from its first enrolment in 1782.

Hevelius, in his *Prodromus*, Maupertuis, in his *Figures des Astres*, and Dr. Derham, in his *Letter to the Royal Society* in 1733, mention the positions of four nebulæ in the head of Capricorn, for which Messier searched in vain. Concluding that his search might have been with his $3\frac{1}{2}^{\text{ft}}$ telescope, I again ransacked the vicinity, and am pretty well satisfied of the non-existence of any nebula or cluster which the instrument of Hevelius could show, and yet be hidden from mine. As to the nebulous wisp [H. 4570] discovered by Sir J. Herschel to the *sf* of σ, it was far beyond the reach of former observers.

1400. 39016 Lalande ANTINOI. (Σ. 2661.)

R.A.	**20h 14m 9s**	Prec.	+	3·12s
Decl.	**S 2° 36′·1**	——	N	11″·09

	Position.	Distance.	Epoch.
Struve, W.	342°·3	24″·3	1828·95
Stone, O.	340·8	24·8	1879·52

A double star. A 8, white; B 9½, white.

1401. 172 B. CYGNI. (Σ. 2666.)

R.A.	**20h 14m 13s**	Prec.	+	2·12s
Decl.	**N 40° 23′·0**	——	N	11″·09

	Position.	Distance.	Epoch.
Struve, W.	241°·9	2″·73	1831·16
Dunér	247·3	2·71	1869·46

A double star. A 7, very white; B 8½, bluish.

1402. 2665 Σ. AQUILÆ.

R.A.	**20h 14m 13s**	Prec.	+	2·79s
Decl.	**N 14° 2′·0**	——	N	11″·09

	Position.	Distance.	Epoch.
Struve, W.	17°·1	3″·1	1829·79

A double star. A 7, white; B 10.

1403. β^2 CAPRICORNI. (Σ. 52 App. I.) DCCXLII.

R. A.	20h 14m 50s	Prec. +	3s·38
Decl.	S 15° 7′·8	—— N	11″·13

	Position.	Distance.	Epoch.
SOUTH	267°·1	203″·7	1824·69
MAIN	267·2	205·9	1865·75
JEDRZEJEWICZ	267·0	205·0	1877·67

A wide pair of stars in the middle of Capricorn's right horn, and $2\frac{1}{2}°$ distant from α, to the S. $\frac{1}{2}$ E. A $3\frac{1}{2}$, orange yellow; B 7, sky-blue; and there are several telescopic companions, to be presently spoken of. The two principal form the Dabih major and Dabih minor of the Catalogues, a name derived from the *Sa'd-adh-dhábiḥ* already mentioned under α Capricorni.

When I commenced testing the properties of my telescope in 1830, Sir J. Herschel sent me the place of a double star which he had discovered, forming the vertex of an obtuse angle, and nearly isosceles triangle, with β^1 and β^2 Capricorni. This he pronounced to be one of the most minute and delicate of such objects, being of the 17th and 18th magnitudes, and 3″ apart; and he moreover added, that the telescope which was not competent to divide this pair could not have the remotest chance of seeing the satellites of Uranus. Under this friendly warning, I took advantage of the very finest weather in the beginning of September to try my power upon it. I gazed in profound quiet and darkness, and readily made out the object (X), from its situation near the following line of a trapezium formed by two telescopic stars to the *np* of β^1 and β^2; but I was utterly unable to split it, although I made every attempt. The largest member of the group, β^2, is followed by a faint coarse double star, which is splendour itself as compared with the test just spoken of.

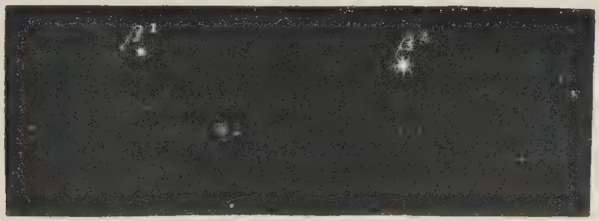

FIG. 45. β^2 CAPRICORNI.

As this whole group forms an admirable criterion for proving the performance of telescopes in light, colour, penetration, and definition, I have frequently reverted to it.

[" The star X and the pair following β^2 are just visible in my $8\frac{1}{2}$in refractor. Admiral Smyth must have had a very good eye to have seen them in a 5·9ⁱⁿ glass."—*Brodie.*]

1404. 2671 Σ. CYGNI.

	h. m. s.				s.
R. A.	**20 15 42**	Prec.	+		1·49
	° ′				″
Decl.	**N 55 3·1**	——		S	11·19

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	341·1	...	2·9	...	1831·11
Main	337·5	...	3·3	...	1868·79

A double star. A 6, white; A 8, ash. Burnham says:—"No change since 1783."

1405. κ^2 SAGITTARII. (β. 763.)

	h. m. s.				s.
R. A.	**20 16 26**	Prec.	+		4·1
	° ′				″
Decl.	**S 42 46·1**	——		N	11·33

	Position.		Distance.		Epoch.
	°		″		
Burnham	24	...	1·24	...	1879·72

A double star. A 6¾; B 7½. The duplicity of this star was discovered by Burnham when at Mount Hamilton in California.

1406. 16 H̥. IV. DELPHINI. (h. 2075; H. 4572; Ɍ.) DCCXLIV.

	h. m. s.				s.
R. A.	**20 17 28**	Prec.	+		2·67
	° ′				″
Decl.	**N 19 44·9**	——		N	11·32

A fine though small planetary nebula, between the Dolphin's pectoral fin and the Arrow's head: it is nearly 6° to the N.N.W. of α Delphini, exactly on the line from that star to α Lyræ. It is in a coarse cluster, in the centre of which are four stars lying *sp* and *nf*; and the nebula follows them, between two stars of the 10th magnitude and some glimpse companions. [Baxendell in 1864 stated that one of these stars, but he did not say which, was no larger than mag. 13.]

Sir J. Herschel, who has figured this object, suggests that the minute stars in close proximity may possibly prove to be satellites. "The enormous magnitude of these bodies," he remarks, "and consequent probable mass (if they be not hollow shells), may give them a gravitating energy, which, however rare we may conceive them to be, may yet be capable of retaining in orbits, three or four times their own diameter, and in periods of great length, small bodies of a stellar character."

[Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 47; *Phil. Trans.*, 1861, Pl. xxviii. Fig. 34; Lamont, *Nebelflecken*, Pl. i. Fig. 5; Lassell, *Mem. R.A.S.*, vol. xxxvi. Pl. ix. Fig. 36.]

1407. 113 P. XX. VULPECULÆ. DCCXLV.

	h.	m.	s.		s.
R. A.	**20**	**17**	**56**	Prec. +	2·58
	°	′			″
Decl.	**N 23**	**43·6**		—— N	11·36

	Position.		Distance.		Epoch.
	°		″		
Smyth	222·4	...	45	...	1837·88

A delicate double star on the Fox's loins, in the midst of a little stellar group closely preceding 118 P. XX., and about 9° to the N.N.W. of *a* Delphini. A 8, bluish white; B 14, indigo blue; and the two point to a dusky 11th magnitude star in the *nf* quadrant, over a sort of crescent of little companions. The intense colour of B is well shown to the averted eye, in a darkened field. About a minute of time preceding this object, and 20′ south of it, is a minute close double star, whose components lie nearly on the parallel; this is Σ. 2672. [Pos. 278°; dist. 1·07″; epoch 1831·80; mags. both 9.]

1408. 116 P. XX. ANTINOI. (Σ. 2677.) DCCXLVI.

	h.	m.	s.		s.
R. A.	**20**	**19**	**1**	Prec. +	3·06
	°	′			″
Decl.	**N 0**	**42·7**		—— N	11·44

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	28·7	...	33·2	...	1828·47
Stone, O.	28·7	...	33·0	...	1879·46

A very delicate double star between the head and bow of Antinoüs. A 7½, white; B [10½], grey. This object is in a poor field, and the *comes* so minute that its distance is only an estimation, though its angle could be caught by the spherical crystal micrometer. It lies about 10° S.E. of *β* Aquilæ, where it is crossed by a line from *a* Delphini to *a* Capricorni. It forms an isosceles triangle with *θ* Antinoi and 69 Aquilæ, the most southerly of 2 stars of 7th mag. near together in finder.

[" Webb has seen B steadily with $3\frac{7}{10}^{\text{in}}$ refractor.]

1409. 56 H. VIII. CYGNI. (h. 2077; H. 4575; ℜ.)

	h.	m.	s.			s.
R.A.	20	19	9	Prec.	+	2·14
		°	′			″
Decl.	N	40	25·6	——	N	11·44

This object is called by Webb a beautiful group, and is thus described by Sir J. Herschel in his *Catalogue* of 1864:—"Cl; pB; pS; P; pC; st 10 . . . 12;" which expanded becomes:—"cluster; pretty bright; pretty small; poor; pretty compressed; stars of mags. 10 to 12." Webb seems to think more of it than Herschel's description would imply. It lies ½° N. of γ, a little *f*.

1410. 3828 h. INDI. (H. 4574.)

	h.	m.	s.			s.
R.A.	20	19	51	Prec.	+	4·27
		°	′			″
Decl.	S	47	23·3	——	N	11·49

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"pB; pL; gbM; 2 st 10 nr;" which means:—"pretty bright; pretty large; gradually brighter in the middle; there are 2 stars of the 10th magnitude near." Precedes α Indi, a star of the 3rd mag., by 18^{m} and 17′ 19″ to the N.

1411. 29 M. CYGNI. (h. 2078; H 4576; ℜ.) DCCXLVII.

	h.	m.	s.			s.
R.A.	20	20	7	Prec.	+	2·21
		°	′			″
Decl.	N	38	9·4	——	N	11·51

	Position.	Distance.	Epoch.
	°	″	
BURNHAM	295·1 ...	66·2 ...	1879·31

A neat but small cluster of stars at the root of the Swan's neck, and in the preceding branch of the Milky Way, not quite 2° S. of γ; and preceding 40 Cygni, a star of the 6th magnitude, by 1° just on the parallel. In the *sp* portion are the two stars here treated as a pair, of which A is 8, yellow; B [8½], dusky. Messier discovered this in 1764; and though his description of it is very fair, his declination is very much out. But one is only surprised that, with his methods and means, so much was accomplished.

1412. π CAPRICORNI.

	h.	m.	s.		s.
R.A.	20	21	1	Prec. +	3·44
	°	′			″
Decl.	S 18	34·3		—— N	11·45

	Position.	Distance.	Epoch.
	°	″	
Knott	144·9	3·1	1871·78
Dembowski	145·2	3·3	1875·00
Stone, O.	146·2	3·4	1876·70

A double star discovered by Burnham. A 6, pale yellow; B 10, bluish.

1413. 140 P. XX. ANTINOI. DCCXLVIII.

	h.	m.	s.		s.
R.A.	20	21	46	Prec. +	3·12
	°	′			″
Decl.	S 2	28·3		—— N	11·63

	Position.	Distance.	Epoch.
	°	″	
South	189·4	59·8	1825·00
Burnham	189·8	59·6	1880·72

A wide double star, a little below the left arm of Antinoüs, and 5° E.S.E. of θ, a star of the 3½ magnitude. A 7½, and B 8, both white, and they point to a star of similar lustre in the lower verge of the field. This object is interesting from the fact that each of its components has a *comes* to the *np*, so that the figure forms a trapezium; intense gazing detects a glimpse star to the S., which throws the diagram into a pentagon. Of these, one of the 12th magnitude is nearest to A, bearing from it 311°, and about 4″ distant.

[“Field if large, very fine.”—*Webb.*]

1414. ρ CAPRICORNI. DCCXLIX.

	h.	m.	s.		s.
R.A.	20	22	35	Prec. +	3·43
	°	′			″
Decl.	S 18	10·6		—— N	11·69

		Position.	Distance.	Epoch.
		°	″	
Smyth	A B	176·7	3·8	1830·73
	A C	150·7	236·0	
Knott	A B	174·2	3·4	1871·80
Stone, O.	A B	172·9	2·9	1877·68

A close double star with a distant companion in the *sf* quadrant, on the animal’s right or following ear; being the middle star of three in a line 4° to the S.S.E. of β. A 5, white; B 9, pale blue; C 7½, yellow.

1415. o^2 CAPRICORNI. DCCL.

R.A.	**20h 23m 36s**	Prec. +	3s·45
Decl.	**S 18° 56′·7**	—— N	11″·76

	Position. °	Distance. ″	Epoch.
Herschel, W.	239·2	23·5	1782·68
Smyth	239·9	21·8	1832·59
Main	237·1	21·2	1869·66
Stone, O.	240·1	22·1	1879·36

A fine double star between the right ear and the eye, to the *sf* of β Capricorni, at less than a degree's distance. A 6 and B 7, both bluish; and they point nearly upon a distant small star in the *nf* quadrant. Though the great southern declination of this object renders measures taken in England liable to be affected by variable refractions, there is great coincidence in the results. It may therefore be assumed that o^2 Capricorni is an optical object.

1416. 232 Dunlop OCTANTIS.

R.A.	**20h 24m 45s**	Prec. +	7s·47
Decl.	**S 75° 43′·7**	—— N	11″·84

	Position. °	Distance. ″	Epoch.
Herschel, J.	17·2	18·7	1836·25

A double star. A 7; B 7½. Owing to the large annual precessions of stars situated as this is, I cannot feel very clear as to the accuracy of the above places, or as to whether the star is or is not 8443 Lacaille.

1417. 178 P. XX. DELPHINI. (Σ. 2690.) DCCLI.

R.A.	**20h 25m 56s**	Prec. +	2s·86
Decl.	**N 10° 53′·4**	—— N	11″·92

		Position. °	Distance. ″	Epoch.
Struve, W.	A B	256·3	14·2	1831·26
Dawes	B C	211·4	0·65	1841·95
Struve, O.	A B	256·6	14·7	1846·95
Romberg	A B	257·2	14·7	1865·68
Jedrzejewicz	A B	256·3	15·2	1877·15
Burnham	A D	108·4	23·1	1878·72
	B C	211·5	0·51	1879·43

A delicate quadruple star in the preceding fin of the tail, and closely *sp* the bright star ε. A 7, and B 7½, both white; C 8, blue; D 12, yellowish; several small stars in the field. This was long viewed as a double star only.

Sir J. Herschel caught up the minute point of light D, which is only to be seen in my instrument by evanescent glimpses, under smooth equatorial clock movement; but by means of a star in the *sf* quadrant, at about 30° from the vertical, the position admits of an approximate estimation. When, therefore, I examined this object at the close of 1835, it was registered as a triple star; how it became quadruple will be best seen in the following extract from a letter addressed to me by Dawes, October 27, 1840:

> "While observing 16 Ħ. III. last night, I met with an interesting circumstance. I felt dissatisfied with the definition of the smaller star, as it would appear oblong. Having measured it as a double star, I applied power 600. The night did not bear it at all, yet the elongated form of the smaller star was confirmed. I got two measures of the direction of the axis. I then altered the power to 420; vision much better; patiently adjusted the focus to the larger star A, which was perfectly round. On re-examining B with the same focus, the elongation of its disc was more obvious than ever. Struve measured this double star four times, once with power 480, and thrice with 320; and if it had been then of the shape it bears now, his scrutinizing eye would have detected it. Of course my observation requires confirmation; but at present I am persuaded this will turn out to be a new binary system."

Circumstances prevented my examining the case until 1842, when it was one of the *agenda* which I took with me to Hartwell House, where, in the self-same telescope with which I had before measured A, B, and C, I saw that B was quite elliptical, with a very sensible major-axis.

By the way, in scrutinizing such objects, pushing in the eye-tube to procure the expanded spectrum called the spurious disc, will, under delicate management, assist in showing whether the image be round, or otherwise; and the light of bright objects thus blunted, is less dazzling than when we let the rays corradiate at the focus. Another useful *ruse* to help the vision, is to withdraw the eye for a few seconds, and direct it towards the darkest recess of the observatory; after which, the field will appear to be comparatively bright.

1418. 94 B. VULPECULÆ. (Σ. 2695.)

R. A.	**20^{h}**	**27^{m}**	**16^{s}**	Prec. +		2·56^{s}
Decl.	**N**	**25°**	**25'·9**	——	N	12"·02

	Position.		Distance.		Epoch.
STRUVE, W.	76°·5	...	0"·79	...	1831·78
STRUVE, O.	75·0	...	1·04	...	1850·84

A double star. A 6½, white; B 8½, white.

1419. 199 P. XX. CYGNI. DCCLII.

	h. m. s.		s.
R.A.	**20 27 29**	Prec. +	1·85
	° ′		″
Decl.	**N 48 50·5**	—— N	12·03

	Position.		Distance.		Epoch.
	°		″		
South	278·8	...	61·3	...	1825·14

A star with a telescopic companion, in a group on the Swan's tail, 4° N. by W. of α Cygni. A 7, white; B 9½, pale blue. This is one of the group which Hevelius terms a nebula; by H. it was mistakenly registered as ω^2 Cygni, which star is in the *sp*.

1420. ω^3 CYGNI. DCCLIV.

	h. m. s.		s.
R.A.	**20 27 55**	Prec. +	1·85
	° ′		″
Decl.	**N 48 51·0**	—— N	12·07

	Position.		Distance.		Epoch.
	°		″		
South	319·0	...	55·8	...	1825·5

A wide double star in the Swan's left leg, in the group 4° N. by W. of α, called *Rukbaṭ al-dajájáh,* the hen's knee. A 5, pale red; B 10, grey: and these with two minute companions form a trapezium, so that the whole might be termed quadruple. [There appear to be no recent measures of this object.]

1421. 103 H. I. DELPHINI. (H. 4586; ℜ.) DCCLIII.

	h. m. s.		s.
R.A.	**20 28 48**	Prec. +	2·94
	° ′		″
Decl.	**N 7 2·3**	—— N	12·12

A small but bright globular cluster, below the Dolphin's tail, and 3½° S. of ϵ, where it is crossed by a line which passes from α Lyræ below β Cygni. It is immediately preceded by a star of the 9th magnitude, and there is a coarse telescopic pair at a distance, near the preceding parallel; with several minute stars in the field. This object is a mass of very small stars, and is therefore installed among Sir J. Herschel's test-objects for trying the space-penetrating powers of telescopes.

1422. 42 H. VI. CEPHEI. (h. 2083; H. 4590; 𝕽.) DCCLV.

	h.	m.	s.		s.
R. A.	20	29	17	Prec. +	1·21
	°	′			″
Decl.	N 60	16·3		—— N	12·16

A large and rich cluster of minute stars on the left elbow of Cepheus: 12° due N. of ω^3 Cygni, and 3° W.S.W. of η Cephei. The preceding portion of the most gathering part of the cluster is formed by a regular angle, or fan-shaped figure; and the whole exhibits a grand but distant collocation of suns, which are evidently bound together by mutual relations, under the energy of a force which, though reason asserts its existence, imagination fails in conceiving.

It may assist him who fishes for this cluster to state, that an 8th magnitude star precedes it by 35^s nearly on the parallel; and it is followed at twice that distance by a 7th magnitude high up in the *sf*, which is itself preceded by a delicate telescopic pair. And there are other stars in the field.

1423. α INDI. (*h. 5209.)

	h.	m.	s.		s.
R. A.	20	29	52	Prec. +	4·26
	°	′			″
Decl.	S 47	40·6		—— N	12·19

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	193·2 ...	45 *est.* ...	1836·68

A conspicuous star with a minute and distant companion; A 3; B 16. Sir J. Herschel states that it was only with the utmost care that he could see this companion, and that he is quite sure that there existed no companion answering to the one said by Dunlop to have been seen at a distance of 5″ from A. Gould describes this star as being of a "bright clear yellow" colour.

1424. 8 H. VII. CYGNI. (H. 4591; 𝕽.)

	h.	m.	s.		s.
R. A.	20	29	57	Prec. +	2·51
	°	′			″
Decl.	N 27	56·2		—— N	12·20

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v B; v L; v Ri; c C; st p L;" which means:—"a cluster; very bright; very large; very rich; considerably compressed; the stars are pretty large."

1425. 2703 Σ. DELPHINI.

	h. m. s.		s.
R. A.	**20 31 40**	Prec. +	2·80
Decl.	**N 14° 21′·0**	—— N	12″·34

		Position. °	Distance. ″	Epoch.
Struve, W.	A B	291·1	25·3	1829·50
	A C	239·4	66·7	
	B C	217·9	54·4	
Dunér	A B	290·5	25·2	1868·53
	A C	238·0	68·7	
	B C	217·4	57·0	
Jedrzejewicz	A B	290·8	25·2	1877·69
	A C	237·4	69·2	
	B C	216·7	57·9	

A triple star. A 7½; B 7½; C 7½. Gledhill considers that there is evidence of an "increase of distance in B C and A C."

1426. β DELPHINI. (Σ. 2704.) DCCLVI.

	h. m. s.		s.
R. A.	**20 32 23**	Prec. +	2·80
Decl.	**N 14° 12′·8**	—— N	12″·37

		Position. °	Distance. ″	Epoch.
Struve, W.	A D	343·8	32·4	1829·40
Burnham	A B	133·6	0·26	1880·68
	A C	114·7	27·5	1880·46
	A D	335·6	35·5	

A delicate [quadruple] star on the Dolphin's body; 1½° S. by W. of α Delphini, and in a line with β Cygni and γ Lyræ. A 4, greenish tinge; [B 5]; C [11½], and D [10½]. A appears in Piazzi's Catalogue under the barbarous term Rotanev, the which putteth derivation and etymology at defiance. (See α Delphini, No. 1430, *post.*)

[Burnham in 1873 found A to be a close double. The angle of A B is rapidly changing: the rate appears to be about + 6° per annum, or even more. The change in the angle of A D is due to the proper motion of A.]

1427. 2705 Σ. CYGNI.

	h. m. s.		s.
R. A.	**20 33 20**	Prec. +	2·39
Decl.	**N 32° 59′·3**	—— N	12″·44

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	262·0	...	3·0	...	1831·86
Main	246·2	...	3·5	...	1868·45
Dunér	263·8	...	2·82	...	1868·49

A double star. A 7½, yellow; B 8½, blue. Presumeably fixed.

1428. 1 AQUARII. (*h. 2984.) DCCLVII.

	h.	m.	s.			s.
R. A.	20	33	46	Prec.	+	3·07
Decl.	N	0°	6′·0	——	N	12″·47

		Position.		Distance.		Epoch.
		°		″		
Burnham	AB	217·4	...	55·8	...	1879·44
	AC	38·9	...	72·9		

A very delicate triple star between the bow of Antinoüs and the head of the Horse; it is 16° S. of α Delphini, and as many E.S.E. of α Aquilæ. A 5½, topaz tint; B [11½], bluish; C [11], ruddy. A and B point to another minute distant *comes* in the *nf*, and there are other telescopic stars in the field.

1429. 2708 Σ. CYGNI.

	h.	m.	s.			s.
R. A.	20	34	30	Prec.	+	2·25
Decl.	N	38°	15′·4	——	N	12″·51

	Position.		Distance.		Epoch.
	°		″		
South	2·3	...	9·6	...	1823·68
Struve, W.	351·7	...	11·2	...	1832·63
Dawes	345·6	...	13·4	...	1841·63
Fletcher	342·0	...	15·7	...	1851·79
Main	336·7	...	17·9	...	1862·48
Flammarion	333·9	...	24·6	...	1877·78

A double star. A 4½, yellow; B 9½, blue. The rapid motion noted above is strictly rectilinear. Not the slightest indications of binarity have been detected. Hall has seen a companion as follows:—Pos. 39·3°; Dist. 15·0″; Epoch 1876·7.

1430. α DELPHINI. DCCLVIII.

	h.	m.	s.			s.
R. A.	20	34	31	Prec.	+	2·78
Decl.	N	15°	31′·4	——	N	12″·52

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	A C 278.0	35 ±	1830.
BURNHAM	A B 225 ±	20 ±	1874.
	A C 279.8	42.2	1878.27
	A D 350 ±	45 ±	1874.
	A E 150.2	47.8	1874.82
	A F 113.9	80.7	1879.34

A bright star on the middle of the Dolphin's body with several distant telescopic companions. A $3\frac{1}{2}$, pale white. [A and C constitute *h. 1554.]

α Delphini appears under the cacophonous and barbaric epithet Svalocin, in the Palermo Catalogue. But no poring into the black-letter versions of the Almagest, El Battání, Ibn Yúnis, and other authorities, enables one to form any rational conjecture as to the mis-reading, mis-writing, or mis-application, in which so strange a metamorphosis could have originated. [But Webb offers a simple solution: "The letters of these strange words, reversed, form NICOLAUS VENATOR, a Latin version of the name of NICCOLO CACCIATORE, Assistant at the Palermo Observatory, in the Catalogue emanating from which these stars are so denominated."]

Δελφῖνος, Δελφίς, Delphinus, Delphis, Curvus, Vector Arionis, Hermippis, Sinon or Simon nautis, are among the names by which the Dolphin has been known, since its enrolment as one of the old 48. The usual representations of the asterism bear little resemblance to any of the cetaceous tribe, it being mostly figured as a huge periwinkle pulled out of its shell; and certainly not "very like a whale." In the MS. of Cicero's translation of Aratus's astronomical poem* in the British Museum (*Harleian*, No. 647), there are coloured figures of the constellations, containing within their outlines the prose descriptions of Hyginus: now these very early drawings exhibit a better dolphin than any of the later maps.

Although this asterism is small, and deficient in first or second rate constituents, it is bright and remarkable from a rhomboid formed of $3\frac{1}{2}$ and 4th magnitude stars. It lies nearly 15° N.E. of α Aquila; where a line from β Lyræ through β Cygni, continued twice as far into the S.E., will meet Svalocin, the *lucida* of the lozenge. The situation of the constellation is also pointed out in the brackish rhymes:

> To heaven's grand arch from deepest seas, behold the Dolphin rise,
> The grace, as old Manilius saith, of ocean and the skies:
> 'Tis placed between that space wherein the Eagle's wings are spread,
> And those few stars unto the east which mark the Horse's head.

---

* This poem had a great "run." It was translated by Cicero, Hyginus, and Germanicus; was commented on by Grotius and other great men; and had the high honour of being quoted by St. Paul, also a Cilician, in Acts xvii. 28.

The ancients allotted 10 stars to this fish, but Eratosthenes and Ovid only 9, because that was the number of the Muses; and the MS. of Cicero's Aratus just mentioned, asserts "sunt stellæ VIIII.' The Catalogues have thus successively numbered the components:

Ptolemy . . .	10 stars.	Flamsteed . . .	18 stars.
Hevelius . . .	14 „	Bode	51 „

1431. 49 CYGNI. (Σ. 2716.) DCCLIX.

	h.	m.	s.				s.
R. A.	**20**	**36**	**35**	Prec.	+		2·42
		°	′				″
Decl.	**N**	**31**	**55·0**	——		N	12·67

	Position.	Distance.	Epoch.
	°	″	
Smyth	49·2 ...	2·9 ...	1832·65
Smyth	48·3 ...	2·7 ...	1850·60
Seabroke	50·8 ...	2·9 ...	1873·69

A close double star a little below the Swan's lower or right wing; it is 8° S.S.E. of γ, and 2° S.S.W. of ϵ Cygni, being the middle star of 3 nearly in a line. A 6, golden yellow; B 9, blue.

Indications of an angular motion, in a direction *np sf*, or retrograde, were once suspected: but as the star is difficult, the discrepancies must be imputed to errors of observation. In 1837 the measures of Struve arrived and confirmed this conclusion; yet he also had considered the star in motion, saying, "Fortasse in hac differentiâ motus manifestatur."

1432. α CYGNI. DCCLX.

	h.	m.	s.				s.
R. A.	**20**	**37**	**40**	Prec.	+		2·04
		°	′				″
Decl.	**N**	**44**	**53·2**	——		N	12·73

	Position.	Distance.	Epoch.
	°	″	
Burnham	105·9 ...	75·1	1879·40

A *Nautical Almanac* star with a telescopic companion, at the root of the Swan's tail. A 1, brilliant white; B 12½, pale blue, the latter well seen when the large star was placed behind a central bar in the eye-piece.

The most usual name of α Cygni is Deneb, a word familiarized from the *dheneb-ed-dajájeh*, hen's tail, of the Arabians. It is 25° E. by N. of Lyra, and therefore about a similar distance to the eye as that star is from Polaris.

Cygnus is a well-known northern constellation between Lyra and Cepheus, and one of the old 48. It was anciently called Ὄρνις, the bird, and Eratosthenes seems to have been the first and only one of that school who dubbed it Κύκνος. It was, however, in no want of names, as Ales, Milvus, Volucris, Olor, and Avis testify. Five of its largest stars form a very regular elongated cross, of which four, δ, γ, ε, and ζ, in a line across the Galaxy, were called by the Arabs *el-fawāris*, the riders; the star opposite Deneb is not so perceptible as the others, but the cross is plainly marked without it. This was assumed as *Christi crux* by Schickard, the "astroscopium," in 1705. The rhymester advises the star-gazer to look for the square of Pegasus, which having easily found,

> From the wing's tip, Alpherat through, now skim aslant the skies,
> And lo! bedeck'd with glorious stars, the soaring Cygnus flies:
> Or, from the westward should you wish the same to gaze upon,
> Arcturus, Gemma, Wega, join to lead you to the Swan.

The comparative brightness of the stars in Cygnus was carefully registered by Sir W. Herschel; whose observations will be found in the *Philosophical Transactions*, 1796 and 1797. It contains double, multiple, and variable stars, clusters, and nebulæ; and its components have been thus progressively shown:

Ptolemy	19 stars.	Hevelius	47 stars.
Tycho Brahé . .	27 ,,	Flamsteed . . .	83 ,,
Bayer	35 ,,	Bode	360 ,,

1433. 43 B. DELPHINI. (Σ. 2723.)

		h.	m.	s.			s.
R. A.		**20**	**39**	**41**	Prec.	+	2·86
		°	′				″
Decl.	**N**	**11**	**54·8**		——	N	12·87

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	85·6	...	1·49	...	1831·71
DAWES	87·4	...	1·47	...	1853·77

A double star. A 7, white; B 9, white. There are 2 distant companions, the nearest of which is in Pos. 33°; Dist. 38″; Epoch 1877·70. (*Burnham.*)

1434. 2725 Σ. DELPHINI.

		h.	m.	s.			s.
R. A.		**20**	**41**	**4**	Prec.	+	2·7
		°	′				″
Decl.	**N**	**15**	**30·2**		——	N	12·93

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	357·6	...	4·3	...	1831·78
DAWES	356·8	...	4·7	...	1854·32
KNOTT	356·8	...	5·1	...	1865·76
DOBERCK	0·9	...	4·8	...	1878·58

A double star. A 7, white or very pale yellow; B 8, white or bluish.

Gledhill remarks, "Change in angle and distance," but the observations do not appear to be very conclusive, especially as regards an alteration in the distance.

1435. 52 CYGNI. (Σ. 2726.) DCCLXI.

R. A.	h. 20 m. 41 s. 7	Prec.	+	s. 2·47
Decl.	N 30° 19′·0	——	N	″ 12·97

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	57·2	...	6·6	...	1830·18
SMYTH	56·9	...	7·0	...	1835·73
SECCHI	59·6	...	6·3	...	1857·35
DOBERCK	60·5	...	6·2	...	1877·70

A neat double star a little below the Swan's right wing. A 5½, orange; B 9½, blue; with a small double star following it. This object is 3° due S. of ϵ Cygni, on a line pointing to the following component of the Dolphin's rhombus. Its apparent fixity is established. Having completed the micrometric operations the illumination was removed; and after considerable attention a peculiar glow indicated the presence in the field of the extraordinary branched nebulosity 15 Ⱨ. V. [=h. 2088; H. 4600].

1436. 15 Ⱨ. V. CYGNI. (h. 2088; H. 4600; ℞.)

R. A.	h. 20 m. 41 s. 7	Prec.	+	s. 2·48
Decl.	N 30° 19′·2	——	N	″ 12·97

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:— "!!; p B; c L; e i F; *k* Cygni inv;" which means:—"a very remarkable object; pretty bright; considerably large; of extremely irregular figure; the star *k* Cygni is involved in the nebula." Engraved, *Phil. Trans.*, 1833, Pl. iii. Fig. 33.

1437. γ DELPHINI. (Σ. 2727.) DCCLXII.

R. A.	h. 20 m. 41 s. 33	Prec.	+	s. 2·78
Decl.	N 15° 43′·9	——	N	″ 13·00

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, W.	274·1	...	11·8	...	1779·74
SMYTH	273·3	...	11·8	...	1839·71
DOBERCK	272·1	...	11·1	...	1878·74
JEDRZEJEWICZ	271·4	...	11·3	...	1880·64

A beautiful double star on the Dolphin's head, and 2° due E. of *α*.

A 4, yellow; B 7, light emerald; with a third star in the *nf* quadrant, about 2¼′ distant. Sir W. Herschel supposed that there was a considerable proper motion in one of these stars, but all the micrometrical measures coincide in establishing its fixity.

[“B appears to vary in colour: it is given as yellow, green, and blue by different observers.”—*Gledhill.*]

1438. 3841 h. SAGITTARII. (H. 4599.)

	h. m. s.		s.
R. A.	**20 41 35**	Prec. +	3·88
	° ′		″
Decl.	**S 38 24·0**	—— N	13·00

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—“B; c S; R; pgmb M; 4 st. p;” which means:—“bright; considerably small; round; pretty gradually much brighter in the middle; 4 stars precede the nebula.”

1439. 8550 Lac. PAVONIS.

	h. m. s.		s.
R. A.	**20 42 2**	Prec. +	5·10
	° ′		″
Decl.	**S 62 50·1**	—— N	13·06

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J.	101·4 ...	3·23 ...	1835·33

A double star. A 6½; B 6½.

1440. η CEPHEI. DCCLXIV.

	h. m. s.		s.
R. A.	**20 43 2**	Prec. +	1·22
	° ′		″
Decl.	**N 61 24·1**	—— N	13·09

	Position.	Distance.	Epoch.
	°	″	
BURNHAM	34·1 ...	100·9 ...	1879·36

A bright star, with a distant telescopic companion, on the bend of the Æthiopian's left arm, and nearly midway on a line from Polaris to Deneb. A 3½, pale yellow; B [12]; several minute stars in the field.

1441. α MICROSCOPII. (*h. 5224.)

R. A. 20h 43m 6s | Prec. + 3·77s
Decl. S 34° 10′·7 | —— N 13″·10

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	164·5	...	21·7	...	1835·61

A double star. A 5; B 9.

1442. λ CYGNI. (O. Σ. 413.) DCCLXIII.

R. A. 20h 43m 7s | Prec. + 2·33s
Decl. N 36° 5′·1 | —— N 13″·10

	Position.		Distance.		Epoch.
	°		″		
Struve, O.	122·3	...	0·65	...	1842·66
Dawes	96·5	...	0·71	...	1860·81
Burnham	85·3	...	0·74	...	1878·52

A close double star, with a distant companion of mag. 10 [Pos. 104°; Dist. 85″; Ep. 1834], on the Swan's lower or right wing: it is 5° S.E. of γ, and is the northern vertex of a neat triangle with it and ϵ. A 5, B 6, both bluish.

1443. 312 P. XX. CAPRICORNI. (*h. 5226.)

R. A. 20h 43m 30s | Prec. + 3·62s
Decl. S 27° 46′·4 | —— N 13″·13

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	70·8	...	15 *est.*	...	1834·57
Stone, O.	67·5	...	18·7	...	1877·68

A double star. A 7½, pale yellow; B 8½, pale blue.

1444. 4 AQUARII. (Σ. 2729.) DCCLXV.

R. A. 20h 45m 35s | Prec. + 3·18s
Decl. S 6° 2′·3 | —— N 13″·26

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	351·5	...	0·5	...	1783·36
Smyth	45·0	...	0·5	...	1834·69
Dawes	65·5	...	0·6	...	1840·72
Dawes	95·9	...	0·5	...	1853·70
Romberg	143·6	...	*elongated*	...	1865·71
Cincinnati Obs.	158·5	...	0·5	...	1877·70
Burnham	167·4	...	0·56	...	1879·71

A binary star, between Aquarius and Equuleus, being the middle one of 3 stars pretty close together, 22° S.E. of α Aquilæ, and 11° N.E. of β Capricorni. A 6, pale yellow; B 8, purple. When I attacked it, the companion appeared beyond my power; but after succeeding in making it wedge-shaped in a direction towards a 14th magnitude star in the *nf* quadrant, long gazing brought up a bright point of light in the same direction. This I estimated to the best of my judgment, and an inspection of all the data leads to the conclusion of a very [rapid] angular motion.

1445. 355 P. XX. EQUULEI. (Σ. 2733.) DCCLXVII.

	h. m. s.		s.
R. A.	20 47 18	Prec. +	2·95
Decl.	N 6° 55′·0	—— N	13″·37

	Position.		Distance.		Epoch.
	°		″		
South	144·7	...	40·6	...	1824·54
Smyth	145·0	...	39·9	...	1836·68
Main	144·8	...	41·8	...	1861·77
Stone, O.	324·1	...	40·3	...	1879·41

A wide double star in the space between the Horse's head and the Dolphin's tail: it is 9° S. by E. of γ Delphini, on a line led by it from γ Cygni. A and B, both 8½, and white, the latter being Piazzi's 356.

1446. 72 M. CAPRICORNI. DCCLXVI.

(h. 2090; H. 4608; R.)

	h. m. s.		s.
R. A.	20 47 24	Prec. +	3·30
Decl.	S 12° 56′·6	—— N	13″·38

A globular cluster of minute stars between Aquarius and the neck of Capricorn; being 9° due E. of α Capricorni, where it follows, at about half a degree, 325 P. XX., a star of the 6½ magnitude. There are many telescopic stars in the field, a small pair of which closely follow the cluster. This object was discovered by the astronomical ferret Messier in 1780, and registered as a nebula: three years afterwards H. resolved it into stars, with his 20ft reflector, and, on guaging, he pronounced its profundity to be of the 243rd order. It will show the reader the care and attention of Sir William to give his next observation of this cluster with the giant-reflector:

> "October 4, 1810. 40ft telescope. Space-penetrating power 191·68. Magnifying power 280. Having been a sufficient time at the telescope to prepare the eye properly for seeing minute objects, the 72d of the *Connoissance des Temps* came into the field. It is a very bright object.
>
> "It is a cluster of stars of a round figure, but the very faint stars on the outside of globular clusters are generally a little dispersed, so as to deviate from a perfectly

circular form. The telescopes which have the greatest light show this best. It is very gradually extremely condensed in the centre, but with much attention, even there, the stars may be distinguished.

"There are many stars in the field of view with it, but they are of several magnitudes, totally different from the excessively small ones which compose the cluster. It is not impossible to form an idea of the number of stars that may be in such a cluster: but I think we cannot estimate them by hundreds. The diameter of the cluster is about one-fifth of the field, which gives 1′ 53·6″."

This cluster is followed, at about 5^{m} Δ R.A. and 7′ to the southward, by a trio of 10th magnitude stars in a poor field: this is 73 M. [=H. 4617].

1447. 376 P. XX. EQUULEI. (Σ. 2735.) DCCLXVIII.

	h.	m.	s.			s.
R. A.	**20**	**50**	**10**	Prec.	+	3·00
		°	′			″
Decl.	**N**	**4**	**6·8**	——	N	13·56

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	289·6	...	2·1	...	1829·48
Smyth	286·8	...	1·8	...	1833·65
Wilson and Seabroke	287·5	...	1·8	...	1873·72

A close double star between the Horse's head and the bow of Antinoüs. A 6, orange tint; B 8, purple.

1448. 76 ♅. VIII. CYGNI. (h. 2091; H. 4615.)

	h.	m.	s.			s.
R. A.	**20**	**50**	**52**	Prec.	+	2·02
		°	′			″
Decl.	**N**	**46**	**51·4**	——	N	13·60

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; P; vl C;" which means:—"a cluster; large; poor; very little compressed."

1449. 14 ♅. V. CYGNI. (h. 2092; H. 4616; 𝕽.)

	h.	m.	s.			s.
R. A.	**20**	**51**	**49**	Prec.	+	2·48
		°	′			″
Decl.	**N**	**31**	**16·6**	——	N	13·67

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!; e F; e L; e E; ei F; bifurcate;" which means:—"a very remarkable object; extremely faint; extremely large; extremely extended; bifurcate, *i.e.* divided into 2 forks."

Engraved, *Phil. Trans.*, 1833, Pl. iii. Fig. 34; Mason, *Mem. Amer. Acad.*, vol. vii. Pl. vii. Fig. 1.

1450. 73 M. CAPRICORNI. (H. 4617; ℜ.)

	h. m. s.		s.
R. A.	20 52 55	Prec. +	3·30
	° ′		″
Decl.	N 13 3·6	—— N	13·74

This object is described by Sir J. Herschel as a cluster, but he puts ?? against it, implying doubt of some kind: and then goes on to speak of it as "e P; vl C;" which means:—"extremely poor; very little compressed;" ending with the words "no neb." I give it however out of regard to Messier's memory.

1451. ε EQUULEI (1 Fl.) (Σ. 2737.) DCCLXX.

	h. m. s.		s.
R. A.	20 53 35	Prec. +	3·01
	° ′		″
Decl.	N 3 52·5	—— N	13·78

		Position.		Distance.		Epoch.
		°		″		
SMYTH	AB	290·0	...	0·5	...	1838·83
	AC	78·1	...	11·2		
SECCHI	AB	287·4	...	0·81	...	1855·88
	AC	74·6	...	10·90		
DOBERCK	AB	288·1	...	0·83	...	1877·74
	AC	75·3	...	10·77	...	1877·81

A most delicate triple star preceding the Horse's *os frontis*, and 12° S.S.E. of *a* Delphini. A 5½, white; B 7½, lilac; with a bright star following at a distance, and a small one in the *nf* quadrant.

I measured it as double in 1833, without noticing the elongation of A. But on receiving Struve's great Catalogue, and perceiving that he made the object to be a triple, I attacked it again, with the above success.

[The distance of AB is perhaps increasing.]

1452. 429 P. XX. CYGNI. (Σ. 2741; ℜ.) DCCLXXI.

	h. m. s.		s.
R. A.	20 54 58	Prec. +	1·92
	° ′		″
Decl.	N 50 2·0	—— N	13·86

	Position.		Distance.		Epoch.
	°		″		
SMYTH	34·6	...	2·1	...	1833·69
SECCHI	30·2	...	1·94	...	1857·16
DOBERCK	28·6	...	1·91	...	1876·77

A close double star on the tip of the Swan's tail, and 5½° N. by E. from *a* Cygni. A 6, silvery white; B 7½, pale grey; the vicinity rich.

This is a beautiful object. Sir J. Herschel concluded that there existed a retrograde annual motion, [and subsequent examinations afford a slight confirmation of the assumption].

1453. 59 CYGNI. (Σ. 2743.) DCCLXXIII.

R. A.	$20^{h.}\ 56^{m.}\ 5^{s.}$	Prec. + $2^{s.}{\cdot}03$
Decl.	N $47^{\circ}\ 5'{\cdot}5$	—— N $13''{\cdot}94$

		Position.	Distance.	Epoch.
Struve, W.	A B	352°·4	20″·2	1831·9
Burnham	A C	140·6	26·7	1879·35

A delicate triple star in the Swan's tail, and the following component of a neat triangle about 3½° to the N.E. of Deneb. A 5½, orange tint; B 10 and C 13, both blue. After the arrival of Σ.'s Catalogue of 1837, observing that he considered the large star to be "alba subviridis," I again examined it in a darkened field, and to my vision it was a decidedly deep yellow. In order to ascertain whether my eye was biassed, or whether the difference of aperture was a cause, I referred the case to the Rev. J. Challis, who, in December, 1841, saw A orange-coloured, B decidedly blue, and C blue, in the great Northumberland equatorial at Cambridge.

1454. 51 H. I. EQUULEI. (h. 2097; H. 4625; 𝕽.)

R. A.	$20^{h.}\ 56^{m.}\ 8^{s.}$	Prec. + $2^{s.}{\cdot}80$
Decl.	N $15^{\circ}\ 45'{\cdot}1$	—— N $13''{\cdot}94$

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; R; gbM;" which means:—"bright; pretty large; round; gradually brighter in the middle."

1455. λ EQUULEI (2 Fl.) (Σ. 2742.) DCCLXXII.

R. A.	$20^{h.}\ 56^{m.}\ 47^{s.}$	Prec. + $2^{s.}{\cdot}96$
Decl.	N $6^{\circ}\ 44'{\cdot}8$	—— N $13''{\cdot}98$

	Position.	Distance.	Epoch.
Smyth	225°·6	2″·6	1833·72
Dunér	226·6	2·5	1868·42
Wilson, &c.	225·2	2·9	1873·72
Jedrzejewicz	224·1	2·6	1879·71

A very neat double star closely preceding the Horse's nose, being

10½° from γ Delphini, the following component of the Dolphin's lozenge. A 6, and B 6½, both white. This is a lovely object. [There are two distant telescopic stars in the *nf* quadrant, and between them and λ Smyth in 1857 caught up a very minute telescopic point of light, which Dawes also saw when his attention was called to it.]

1456. 192 ♅. I. CEPHEI. (h. 2099; H. 4627; 𝕽.)

R. A. 20ʰ 57ᵐ 9ˢ | Prec. + 1ˢ·75
Decl. N 54° 7′·3 | —— N 14″·01

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"c B; L; E 45° ±; r; ⁑ att;" which means:—"considerably bright; large; extended in the direction of about 45° with the meridian; hardly resolveable—mottled as if with stars; there is a double star attached to the nebula."

Engraved, Rosse, *Phil. Trans.*, 1861, Pl. xxx. Fig. 37.

1457. 2744 Σ. AQUARII.

R. A. 20ʰ 57ᵐ 29ˢ | Prec. + 3ˢ·06
Decl. N 1° 5′·9 | —— N 14″·03

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	190·5	...	1·52	...	1830·16
Mädler	188·5	...	1·75	...	1841·63
Secchi	184·3	...	1·57	...	1856·46
Schiaparelli	172·9	...	1·52	...	1876·63

A double star. A 6½, white; B 7½, white. Slow retrograde motion.

1458. 452 P. XX. CYGNI. (Σ. 2748 rej.) DCCLXXVI.

R. A. 20ʰ 58ᵐ 7ˢ | Prec. + 2ˢ·29
Decl. N 39° 4′·6 | —— N 14″·07

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	298·4	...	17·5	...	1783·75
Smyth	297·0	...	17·0	...	1832·87
Dembowski	299·5	...	18·7	...	1876·80

A neat double star, on the verge of the Swan's right wing, following γ just S. of its parallel, and 6° S. by E. of α Cygni. A 7, deep yellow; B 11, emerald hue: there are several telescopic stars in the field, of which one in the *sf*, of the 13th magnitude, is sufficiently near to form with A and B a triple object. This was detected by Σ., 2748, but afterwards branded with "*rej.*;" perhaps considering the *comes* too distant and too small a point to merit measurement.

[Ward of Belfast discovered in 1876 with a $4{\cdot}2^{in}$ refractor another companion. Pos. 250°; Dist. 25″; Epoch 1878·47. (*Burnham.*)]

1459. 1 ♅. IV. AQUARII. (h. 2098; H. 4628.) DCCLXXIV.

	h. m. s.		s.
R. A.	**20 58 10**	Prec. +	3·27
	° ′		″
Decl.	**S 11 47·7**	—— N	14·06

A planetary nebula in the middle of the Water-bearer's scarf; it is 12° following *α* Capricorni slightly to the N. of its E. parallel, where a line from the Eagle's tail over *θ* Antinoi, and as far again, reaches it. This object is bright to the very disc, and but for its pale blue tint would be a very miniature of Venus. It was discovered at Slough in September, 1782; and is one of Σ.'s 9 rare celestial objects, appended to the Dorpat Catalogue of 1827, where its form is pronounced to be elliptical. ["One of the finest specimens of these extraordinary bodies."—*Webb.* The late Earl of Rosse, Lassell, and Secchi all gave much attention to it. Lord Rosse named it the "Saturn nebula." Lassell saw it as an elliptic ring with a star in the centre. Huggins finds that a gaseous spectrum is yielded.]

According to the already-cited theory of Sir J. Herschel, who makes its apparent diameter about 20″, if this object be only equally distant from us with the stars, its real dimensions must be such as would fill the whole orbit of Uranus. Now a globular body of the magnitude of the orbit of Uranus would contain within its periphery more than 68,000 millions of globes as large as our Sun!

The works and design of the Omnipotent Creator are inscrutable to the most brilliant human intellect: yet enough is revealed, both with regard to the wondrous Universe and our own mental capacity, to convince the reflecting mind that it is a mark of devotion which we owe to our Maker to study with earnestness the beautiful and harmonious works around us, however their immensity may at first bewilder us. He who zealously applies himself will verify the sacred promise, "Those who seek shall find." In worldly pursuits a long novitiate is devoted to acquire the imperfect concoctions of man: how much more is due to catch a glimpse of the imperishable laws of the CREATOR!

[Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 44; *Phil. Trans.*, 1850, Pl. xxxviii. Fig. 14; D'Arrest, *Dissertation*, 1861, Pl. ii. Fig. 1; Lamont, *Nebelflecken*, Pl. i. Fig. 4; Lassell, *Mem. R.A.S.* vol. xxxvi. Pl. x. Fig. 37; Secchi, *Descrizione Osserv. Coll. Rom.*, Pl. iv. Fig. 2.]

1460. 12 AQUARII. (Σ. 2745.) DCCLXXV.

	h. m. s.		s.
R. A.	20 58 16	Prec. +	3·18
Decl.	S 6° 15′·5	—— N	14″·07

	Position.		Distance.		Epoch.
Struve, W.	189°·6	...	2″·6	...	1831·31
Smyth	191·0	...	2·8	...	1834·82
Wilson, &c.	191·0	...	3·1	...	1873·72
Stone, O.	190·3	...	2·9	...	1879·39

A close double star in the space between the Water-bearer's scarf and the Horse's head, and about 24° S. by E. of *a* Delphini, being the brightest of several near the spot. A 5½, creamy white; B 8½, light blue.

1461. 83 B. CEPHEI. (Σ. 2751.)

	h. m. s.		s.
R. A.	20 59 7	Prec. +	1·65
Decl.	N 56° 14′·1	—— N	14″·12

	Position.		Distance.		Epoch.
Struve, W.	344°·1	...	1″·86	...	1831·96
Dawes	347·1	...	1·81	...	1853·88

A double star. A 6¼, very white; B 7½, very white.

1462. 8511 Lac. OCTANTIS. (h. 5235.)

	h. m. s.		s.
R. A.	20 59 48	Prec. +	14·52
Decl.	S 84° 45′·6	—— N	14″·17

	Position.		Distance.		Epoch.
Herschel, J.	92°·1	...	2½″ *est.*	...	1837·73
Santiago Obs.	84·5	...	3·9	...	1851·03

A double star. A 8; B 8. No importance must be attached to the seeming change in the distance, for at a sweep a few days later than the one from which the above is derived Sir J. Herschel himself put the distance at 4″. The annual precession of this star in R.A. is, it will be seen, very great.

1463. 61¹ CYGNI. (Σ. 2758.) DCCLXXVII.

	h. m. s.		s.
R. A.	21 1 57	Prec. +	2·67
Decl.	N 38° 12′·5	—— N	14″·30

	Position.		Distance.		Epoch.
	°		″		
Bradley	35·4	...	19·6	...	1753·80
Mayer	50·9	...	15·2	...	1778
Herschel, W.	53·5	...	16·1	...	1780·72
Bessel	79·1	...	16·7	...	1812·30
Struve, W.	83·0	...	15·2	...	1819·90
Dawes	90·3	...	15·7	...	1830·66
Smyth	96·3	...	16·3	...	1839·60
Mädler	103·1	...	16·8	...	1850·95
Struve, O.	108·7	...	18·2	...	1860·80
Dembowski	113·9	...	19·1	...	1870·58
Doberck	116·7	...	20·0	...	1878·72
Jedrzejewicz	117·6	...	20·1	...	1879·79

A double and perhaps binary star which, from its extraordinary motions, was placed on the *Nautical Almanac* List, being then the smallest body so honoured. A 5½, and B 6, both yellow, but the small one is of the deepest tint. This most interesting object is situated on the inner tip of the Swan's right wing, 7½° S. by E. of *a* Cygni, and nearly on the E. parallel of Wega.

This star must be regarded as one of the nearest to us, from the great rapidity of its proper motions; and it affords a positive instance of a double star which, besides the individuals revolving round each other, or about their common centre of gravity, has a progressive uniform motion towards some determinate region. This path is relatively spiral, but still so vast as to appear rectilinear; but too little is yet known of its amount and direction to refer it to definite laws. The values, however, have been pretty exactly ascertained:

	61¹ Cygni.		61² Cygni.
Baily ...	R. A. + 5·18″; Decl. + 3·24″	...	R. A. + 5·28″; Decl. + 3·03″.
Argelander	R. A. + 5·11″; Decl. + 3·23″	...	R. A. + 5·19″; Decl. + 3·02″.

The above data afford much room for reflection. The anomalies are much greater than two stars with 16″ between them ought to exhibit, but still there is some allowance to be made in a branch of astronomy which must even yet be considered as new. The average annual motion from the results before us, in the direction *sp nf*, or direct, appears to be about ½° or a little less per annum, whence a revolution of about 5 or 6 centuries may be concluded: and while one star is thus going round the other, the pair is journeying through the vastness of space with incomprehensible velocity. Such motions afford a wondrous proof of illimitable power, whether we consider its exertion in the original production of these motions, or in controlling them. So far the vast mechanism of Infinite Nature is before us: but human reason is utterly incapable of speculation upon the end and aim of the UNFATHOMABLE WILL.

Piazzi was the first who detected the extraordinary movements of 61 Cygni, as shown at p. 10. l. vi. of the book *Del Reale Osservatorio di Palermo*, published in 1806. Yet in 1812, the *Moniteur Universel*, 189, attributes the discovery to Bessel, who indeed had sent an interesting memoir to Baron De Zach's *Monatliche Correspondenz*. In his Catalogue of 1814 Piazzi makes a reclamation, and Bessel handsomely acknowledged the priority of the Italian astronomer. Such was the note of preparation which drew attention to the object, and led to that splendid result, SIDEREAL PARALLAX. That two stars should be moving in an apparently rectilinear path at so large a rate, while other stars in the neighbourhood did not appear to be affected with any proper motion, was an incident of promise. It was Bessel who placed a foundation for precise and definite conceptions of the vast distances of stellar bodies. The means by which he made the signal discovery of parallax cannot be better given than in his own words, from a letter which he addressed to Sir J. Herschel, under date of the 23rd of October, 1838:

> "I selected among the small stars which surround 61 Cygni, two between the 9th and 10th magnitudes; of which one (a) is nearly perpendicular to the line of direction of the double star; the other (b) nearly in this direction. I have measured with the heliometer the distances of these stars from the point which bisects the distance between the two stars of 61 Cygni; as I considered this kind of observation the most correct that could be obtained, I have commonly repeated the observation sixteen times every night."

The result of his assiduous measurement is, that in summer 61 Cygni was further from a by 0·620″ than in winter, and further from b by 0·437″. These numbers I derive from a mean of the observations in May, June, and July; and those of November, December, and January. The difference in the amount yielded by the two stars is accounted for by a being almost at half the distance of b, and in a better angle of position: thus

a Pos. 201° 29′ 24″; Dist. 461·617″
b Pos. 109° 22′ 10″; Dist. 706·279″

Yet it is only an apparent disproportion, for, after due reduction, the probable value is brought down to 0·3136″, according to the following explanation given by the illustrious discoverer:

> "As the mean error of the annual parallax of 61 Cygni is only ±0·0202″, and consequently not $\frac{1}{15}$ of its value computed; and as these comparisons show that the progress of the influence of the parallax, which the observations indicate, follows the theory as nearly as can be expected considering its smallness, we can no longer doubt that this parallax is sensible. Assuming it 0·3136″, we find the distance of the star 61 Cygni from the Sun 657,700 mean distances of the Earth from the Sun: light

employs 10·3 years to traverse this distance. As the annual proper motion of (61) Cygni amounts to 5·123″ of a great circle, the *relative* motion of this star and the Sun must be considerably more than 16 semi-diameters of the Earth's orbit, and the star must have a constant of aberration of more than 52″. When we shall have succeeded in determining the elements of the motion of both the stars forming the double star, round their common centre of gravity, we shall be able also to determine the sum of their masses. I have attentively considered the preceding observations of the relative positions; but I consider them as yet very inadequate to afford the elements of the orbit. I consider them sufficient only to show that the annual angular motion is somewhere about $\frac{2}{3}$ of a degree; and that the distance at the beginning of this century had a minimum of about 15″. We are enabled hence to conclude that the time of a revolution is more than 540 years, and that the semi-major axis of the orbit is seen under an angle of more than 15″. If, however, we proceed from these numbers, which are merely *limits*, we find the sum of the masses of both stars less than half the Sun's mass."

For these very delicate researches, the gold medal of the Royal Astronomical Society of London was awarded to Bessel: "researches," said Sir J. Herschel, "which have gone far to establish the existence and to measure the quantity of a periodical fluctuation, annual in its period, and identical in its law with parallax."

[A more recent value for the parallax of 61 Cygni is Auwers's, which is = 0·56″.]

1464. 6980 Brisb. INDI. (*h. 5246.)

	h.	m.	s.		s.
R. A.	**21**	**2**	**19**	Prec. +	4·44
		°	′		″
Decl.	**S**	**55**	**0·8**	—— N	14·32

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	116·8	...	1½ *est.*	...	1836·44

A double star. A 8; B 8.

1465. 4004 ARGELANDER + 41° CYGNI.

	h.	m.	s.		s.
R. A.	**21**	**2**	**53**	Prec. +	2·25
		°	′		″
Decl.	**N**	**41**	**47·7**	—— N	14·36

This is the object known as "Webb's Gaseous Nebula." Mr. Webb states that on November 14, 1879, as he was sweeping in Cygnus with a low power on a $9\frac{1}{4}^{\text{in}}$ silvered mirror he came across an object which resembled a star of mag. 9 with a bluish tinge, and which on closer examination did not entirely resemble other stars of that size, and which was soon found by a change of eye-piece to be of an entirely different nature. Under higher powers it appeared as a nebulous disc surrounded perhaps by a feeble glow, and about 4″ in diameter. On their attention being called to it various observers examined it. Copeland found that it was not round, and that it had a sharp nucleus near the *np* edge with a faint effusion of light in the opposite direction. Knott assigned to it a magnitude of 8½. To him it presented the appearance of a bright bluish-white nebulosity slightly elongated *np, sf,* and he was under the impression that it was brightest at its *np* extremity, herein agreeing with Webb. Several observers have examined this object with the spectroscope and found it more or less monochromatic. In other words, it is presumed to be gaseous. Winnecke found the length of the major axis to be 5·7″.

1466. 1 P. XXI. CYGNI. (Σ. 2762.) DCCLXXVIII.

	h. m. s.		s.
R. A.	21 3 59	Prec. +	2·53
	° ′		″
Decl.	N 29 45·6	—— N	14·42

	Position.	Distance.	Epoch.
	°	″	
SOUTH	315·2	3·5	1824·70
SMYTH	316·5	3·5	1833·92
DEMBOWSKI	310·7	3·4	1854·62
GLEDHILL	313·0	3·4	1874·80

A very neat double star, towards the tip of the Swan's right wing, 1½° *p* ζ Cygni. A 6½, dull white; B 9, pale lilac; and there is a third star in the *sp* quadrant. This appears to be an optical object.

1467. γ EQUULEI.

	h. m. s.		s.
R. A.	21 4 59	Prec. +	2·9
	° ′		″
Decl.	N 9 41·3	—— N	14·40

		Position.	Distance.	Epoch.
		°	″	
KNOTT		277·6	2·1	1871·60
BURNHAM	A B	274·5	2·1	1877·72
	A C	10·0	41·3	

A star discovered as a double by Knott and made triple by Burnham. A 4½, yellow; B 11, blue; C 12. Knott describes this as an "exquisite" object.

1468. 2769 Σ. VULPECULÆ.

	h. m. s.		s.
R. A.	21 5 35	Prec. +	2·70
	° ′		″
Decl.	N 22 0·4	—— N	14·52

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	300·8	17·8	1830·17
MAIN	300·4	18·2	1864·65

A double star. A 7, white; B 8, white.

1469. 2107 h. CYGNI. (H. 4645; 𝕽.)

	h.	m.	s.		s.
R. A.	21	7	18	Prec. +	2·15
	°	′			″
Decl. N	45	13·8		—— N	14·62

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vL; pRi; E; st 10;" which means:—"a cluster; very large; pretty rich; extended; the component stars are chiefly of the 10th magnitude."

1470. 51 P. XXI. CEPHEI. (Σ. 2780.) DCCLXXXI.

	h.	m.	s.		s.
R. A.	21	8	59	Prec. +	1·53
	°	′			″
Decl. N	59	32·0		—— N	14·73

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	228·7	1·1	1831·82
SMYTH	229·5	1·3	1834·78
WILSON, &c.	224·3	1·0	1873·81

A close double star in the space between the Æthiop's head and his left arm; and nearly 3° S. by W. of α Cephei. A 6½, and B 7½, both silvery white.

1471. 3859 h. INDI. (H. 4647.)

	h.	m.	s.		s.
R. A.	21	8	59	Prec. +	4·11
	°	′			″
Decl. S	48	49·4		—— N	14·73

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; c S; c E; psmb M; * 10 *f*;" which means:—"bright; considerably small; considerably extended; pretty suddenly much brighter in the middle; a 10th mag. star follows."

1472. δ EQUULEI. (Σ. 2777.) DCCLXXX.

	h.	m.	s.		s.
R. A.	21	9	7	Prec. +	2·92
	°	′			″
Decl. N	9	33·9		—— N	14·73

		Position.	Distance.	Epoch.
		°	″	
STRUVE, W.	A C	41·4	26·6	1830·67
KAISER	A C	34·0	28·5	1842·64
STRUVE, O.	A B A C	22·5 30·9	*not given* 31·3	1852·64
STRUVE, O.	A B A C	203·3 26·1	0·5 ± 34·7	1865·91
WILSON and SEABROKE	A C	24·2	37·6	1876·81
BURNHAM	A B A C	29·1 22·7	0·35 37·9	1880·60

A triple star in the Horse's mouth, preceding ε Pegasi by about 7½°

on its W. parallel, where a line carried from β Cygni over α Delphini, and 12° further into the S.E., intersects it. A 4½, topaz yellow; [B 11], C 11; and there are other stars in the following part of the field.

[This star was measured by Smyth and observers before him as double, A and C being the components, but O. Struve found A itself to be double (=O. Σ. 535) some 30 years ago, making the whole system a triple. It has all along been found very difficult to obtain good measures of AB, but there can be no doubt that they form a binary pair with a period of about either 7 years or twice that time. The motion of A C is rectilinear.]

The little asterism Equuleus was unknown to Aratus and Eratosthenes, and consequently to Cicero, Germanicus, and Avienus. Hence Hood remarks, "This constellation was named of almost no writer, saving *Ptolomee*, and *Alfonsus* who followeth Ptolomee, and therefore no certain tail or historie is delivered thereof, by what means it came into heaven." Yet it is one of the old 48, and has been widely known under the various names, *Ἵππου προτομὴ*, Sectio equi, Equus prior, Equus minor, Equiculus, Præsegmen, the little horse, and the horse's head, &c. It is distinguished by a trapezium of four stars of the 4th magnitude (α, β, γ, δ). Its components have been thus numbered:

Ptolemy	4 stars.	Hevelius	6 stars.
Tycho Brahé . .	4 ,,	Flamsteed . . .	10 ,,
Kepler	4 ,,	Bode	36 ,,

and its place in the firmament is pointed out by a couple of lines from the brackish lays of the rhymester:

> When Pegasus within our view, his spacious square doth spread,
> Midway from Markab to Altair you'll find the Horse's head.

1473. 406 Dunlop INDI. (h. 3860; H. 4651.)

	h.	m.	s.		s.
R. A.	21	11	29	Prec. +	4·11
	°	′			″
Decl. S	49	1·5		—— N	14·87

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p S; E; mb M;" which means:—"very bright; pretty small; extended; much brighter in the middle."

1474. θ INDI. (*h. 5258.)

	h.	m.	s.		s.
R. A.	21	12	2	Prec. +	4·34
	°	′			″
Decl. S	53	54·7		—— N	14·91

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	307·0	...	3·7	...	1834·50

A double star. A 5½; B 10.

1475. *α* CEPHEI. DCCLXXXIII.

	h.	m.	s.			s.
R. A.	**21**	**15**	**56**	Prec. +		1·41
		°	′			″
Decl. N		**62**	**7·1**	——	N	15·13

	Position.		Distance.		Epoch.
	°		″		
Burnham	23·4	...	208·9	...	1879·74

A *Nautical Almanac* star with a distant companion, on the left shoulder of Cepheus; it is nearly in mid-distance between Polaris and Deneb, and 8° S. ¼ W. from *β* Cephei. A 3, white; B 10, pale blue, with a companion of the same magnitude and colour. This star appears on the Catalogues as Alderamin, a corruption of the *Al-dera-imin* of the Alphonsine Tables, which is from the Arabic *al-dhirá' alyemín*, the right arm.

Κηφεὺς, Cepheus, Inflammatus, Flammiger, and Dominus Solis, are the names by which European astrophilæ have distinguished one of the old 48 constellations, situated between Cassiopeia and Draco; where, of course, in our latitude, it is circumpolar. But Columella, in his Agricultural Almanac, seems to borrow his celestial rules from the Alexandrian Greeks, without considering the different parallel of Rome, for he makes the Great Bear rise and Cepheus set. The *effigies* of Cepheus has been sadly pulled about, although Ptolemy has given the exact places of its several limbs. Grotius, in his notes to *Germanicus*, complains of the liberties taken with the text of *Aratus*, in order to make it accord with the drawings of the artists; and similar freedom is still exercised. He is, however, pretty fairly represented on the noted planisphere of Geruvigus, and in Morel's *Aratus*, 1559; but the early Venetian illustrations to Hyginus, and Julius Firmicus, gird a long Toledo blade to his loins, such as an Argonaut never saw. Hevelius even places the Pole-star on his kilt. The true position may be inferred from the galley-rhymes:

Near to his wife and daughter see aloft where Cepheus shines,
That wife, the Little Bear, and Swan, with Draco bound his lines;
Beneath Polaris, twelve degrees, two stars the eye will meet,
Gamma, the nomade shepherd's gem, and *kappa*, mark his feet;
Alphirk, the Hindú's K̇alpeny, points out the Monarch's waist,
While Alderamin, beaming bright, is on the shoulder placed:
And where o'er regions rich and vast, the Via Lactea's led,
Three stars, of magnitude the fourth, adorn the Æthiop's head.

Cepheus was an asterism of note among the Arabians as *al-Multahab*, the flaming, and *al-Aghnán*, the sheep.

Cepheus has been an object of great attention among astronomers, as it exhibits some choice and remarkable variable and double stars, nebulæ, and clusters. Sir W. Herschel has tabulated the comparative brightness of its components, in the *Phil. Trans.*, 1797, the numbers of which have thus progressively increased:

Ptolemy	13 stars.	Hevelius	51 stars.
Tycho Brahé .	11 „	Flamsteed . . .	35 „
Bayer	17 „	Bode	294 „

1476.

2790 Σ. CEPHEI.

		h.	m.	s.			s.
R. A.		**21**	**16**	**13**	Prec.	+	1·66
		°	′				″
Decl.	**N**	**58**	**9·1**		——	N	15·15

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	46·5	...	4·5	...	1832·05

A double star. A 6, very red; B 11, blue.

1477.

1 PEGASI. (Σ. 11. App. II.) DCCLXXXII.

		h.	m.	s.			s.
R. A.		**21**	**17**	**0**	Prec.	+	2·76
		°	′				″
Decl.	**N**	**19**	**20·0**		——	N	15·19

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	308·3	...	37·1	...	1780·69
South	310·2	...	36·8	...	1825·22
Smyth	310·8	...	36·4	...	1833·95
Main	310·2	...	37·1	...	1862·52

A double star between the head of Pegasus and the hind legs of the Fox; and about 10½° S. by E. of ζ Cygni. A 4, but considered variable, pale orange; B 9, purplish.

The close agreement of the above measures shows that there has been no notable change; yet the proper motions of A are of a very sensible value; proving B to be affected with a similar movement, or a variation must have been shown.

[I have been unable to discover any confirmation of Smyth's statement as to 1 Pegasi being variable.]

1478. β EQUULEI. DCCLXXXIV.

		h.	m.	s.			s.
R. A.		21	17	25	Prec.	+	2·97
		°	′				″
Decl.	N	6	20·5		——	N	15·22

		Position.		Distance.		Epoch.
		°		″		
Burnham	A B	260·1	...	32·1	...	1877·77
	A C	308·7	...	67·4		
	C D	10·4	...	6·0		
	A E	275·9	...	86·2	...	1878·63

A multiple star on the Horse's cheek, at about 4° S.E. of δ, on the line towards Fomalhaut. A 5½, lucid white; B 14; C 13; D 16; E 14. This group is a severe trial of vision and estimation; it was recommended to me by Sir J. Herschel, in a letter of 11th June, 1831: "As you are testing your telescope, there is a pretty test-object in β Equulei, which is a coarse triple, and one of the small stars itself is a pretty first-class double star." [The nearest star, B, was discovered by Burnham with an 18½in refractor in 1877.]

1479. θ^2 MICROSCOPII. (β. 766.)

		h.	m.	s.			s.
R. A.		21	17	27	Prec.	+	3·8
		°	′				″
Decl.	S	41	28·1		——	N	15·30

	Position.		Distance.		Epoch.
	°		″		
Burnham	314·1	...	0·83	...	1879·72

A double star. A 5; B 6. Discovered to be double by Burnham at Mount Hamilton, in California, and called by him "a fine pair."

1480. 3862 h. INDI. (H. 4658.)

		h.	m.	s.			s.
R. A.		21	19	0	Prec.	+	4·60
		°	′				″
Decl.	S	60	29·7		——	N	15·30

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; lC; gpmbM;" which means:—"bright; pretty large; little compressed; gradually pretty much brighter in the middle."

1481. 8809 Lac. SAGITTARII. (β. 767.)

	h. m. s.			s.
R. A.	**21 20 3**	Prec.	+	3·88
	° ′			″
Decl.	**S 43 1·4**	——	N	15·42

	Position.	Distance.	Epoch.
	°	″	
Burnham	146·4	4	1879·71

A double star. A 6; B 9. Discovered to be double by Burnham at Mount Hamilton, in California.

1482. 2797 Σ. PEGASI.

	h. m. s.			s.
R. A.	**21 21 25**	Prec.	+	2·87
	° ′			″
Decl.	**N 13 12·4**	——	N	15·45

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	213·3	4·6	1828·64
Mädler	215·5	3·2	1842·71
Morton	214·5	3·5	1856·82
Dunér	216·3	3·1	1868·94

A double star. A 7½, very white; B 9, ash-coloured.

1483. 20 B. PEGASI. (Σ. 2799.)

	h. m. s.			s.
R. A.	**21 23 31**	Prec.	+	2·91
	° ′			″
Decl.	**N 10 36·5**	——	N	15·56

	Position.	Distance.	Epoch.
	°	″	
South	338·1	1·20	1825·68
Dawes	327·4	1·26	1840·72
Mädler	324·4	1·70	1850·75
Mädler	321·6	1·47	1861·81
Talmage	315·4	1·47	1871·70
Doberck	310·8	1·33	1878·62

A double star. A 7, yellowish; B 7, yellowish. The change of angle in a retrograde direction is very marked, but the distance seems unchanged.

1484. 15 M. PEGASI. (h. 2120; H. 4670; ℜ.) DCCLXXXV.

	h. m. s.			s.
R. A.	**21 24 38**	Prec.	+	2·90
	° ′			″
Decl.	**N 11 40·3**	——	N	15·62

A globular cluster between the mouths of Pegasus and Equuleus, forming the northern vertex of a triangle, obtuse and nearly isosceles, of which the base is ε Pegasi and δ Equulei. This fine object was discovered by Maraldi in 1745, and registered as "une étoile nébuleuse, assez claire, qui est composée de plusieurs étoiles." Messier could not quite make this out, but in 1764 described it as a nebula with a star, its form circular and centre brilliant; and the place assigned to it was very considerably in error. Thus it remained till 1783, when Sir W. Herschel resolved it into stars, and found it a good object for proving the telescope's space-penetrating power; he estimated its profundity to be of the 243rd order.

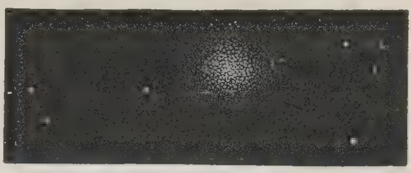

FIG. 46. 15 M. PEGASI.

Although this noble cluster is rated globular, it is not exactly round, and under the best circumstances is seen as in the diagram, with stragglers branching from a central blaze. Under a moderate magnifying power, there are many telescopic and several brightish stars in the field; but the accumulated mass is completely insulated, and forcibly strikes the *senses* as being almost infinitely beyond those apparent *comites*.

1485. 52 ♅. VII. CYGNI. (h. 2122; H. 4673; 𝕽.)

		h.	m.	s.			s.
R.A.		**21**	**25**	**27**	Prec.	+	2·19
			°	′			″
Decl.	**N**		**46**	**36·7**	——	N	15·66

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; c Ri; l C; st 10 . . . 13;" which means:—"a cluster; large; considerably rich; not much compressed; the component stars range from the 10th to the 15th magnitudes."

1486. β AQUARII. DCCLXXXVI.

		h.	m.	s.			s.
R.A.		**21**	**25**	**46**	Prec.	+	3·16
			°	′			″
Decl.	**S**		**6**	**3·3**	——	N	15·73

		Position.	Distance.	Epoch.
		°	″	
BURNHAM	A B	320·0	34·2	1877·70
	A C	185·6	55·0	

A *Nautical Almanac* star, with 2 minute acolytes on the Water-bearer's right shoulder; and in mid-distance between Fomalhaut and the

Dolphin's rhombus. A 3, pale yellow; B [13], blue; [C 14]. This is a most difficult object, and one requiring the utmost delicacy of treatment even for an estimation.

β Aquarii is the *Kalpeny* of the Hindús, and the Sadalsuud of the Palermo and other Catalogues.

1487. 32 H̥. VI. CYGNI. (h. 2124; H. 4676; ℜ.)

		h. m. s.		s.
R. A.		21 26 44	Prec. +	2·04
Decl.	N	51° 5′·9	—— N	15″·74

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; c L; v Ri; p C; st 11 . . . 16;" which means:—"a cluster; considerably large; very rich; pretty compressed; the component stars range from the 11th to the 16th magnitudes."

1488. β CEPHEI. (Σ. 2806.) DCCLXXXIX.

		h. m. s.		s.
R. A.		21 27 14	Prec. +	0·79
Decl.	N	70° 4′·6	—— N	15″·76

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	254·5	...	13·1	...	1779·67
Smyth	251·0	...	13·7	...	1843·16
Wilson and Seabroke	250·9	...	13·4	...	1873·79
Jedrzejewicz	250·7	...	13·3	...	1878·62

A *Nautical Almanac* star, double, on the left side of the monarch's girdle, and two-thirds of the distance from Polaris to α Cephei. A 3, white; B 8, blue, with a coarse but very minute double star preceding. This beautiful object was recorded double by Piazzi; but he made the companion too small; "1·4″ temporis, fere in eodem paralello, præcedit alia 11ae magnitudinis."

β Cephei is known as Alphirk, and Ficares, from the Arabian *kawákib-al-firk*, stars of the flock, which α, β, and η were supposed to represent. In Arabia they may be either sheep or antelopes. Herds and flocks constituted very natural imagery among the Nomades; and at one epoch the starry heavens appear to have been almost filled with them.

1489. 2 M. AQUARII. (h. 2125; H. 4678; ℜ.) DCCLXXXVII.

		h. m. s.		s.
R. A.		21 27 44	Prec. +	3·09
Decl.	S	1° 19′·1	—— N	15″·79

A fine globular cluster preceding the Water-bearer's neck, and about

5° N. ½ E. from β. This appears to have been discovered by Maraldi in 1746, while hunting up M. Cheseaux's comet. Some years afterwards, Messier described it as a nebula containing no star, centre brilliant and surrounded by a circular light, altogether resembling the nucleus of a comet. Maraldi shows that little was then understood about nebulæ, for after mentioning that he could make out no stars, he continues, "Ce qui me parut fort singulier; car la plupart des étoiles qu'on appelle nébuleuses sont environnées d'un grand nombre d'étoiles; ce qui a fait juger que la blancheure que l'on y découvre, est l'effet de la lumière d'un amas d'étoiles trop petites pour être aperçues par les plus grandes lunettes." Now it is well established that, even where a globular cluster may not appear insulated, the stars belonging to it may be easily distinguished from those which happen to be scattered about or upon it.

This magnificent ball of stars condenses to the centre, and presents so fine a spherical form, that imagination cannot but picture the inconceivable brilliance of their visible heavens to its animated myriads. It was observed and figured by Sir J. Herschel (No. 2125 in his *Catalogue* of 1833), who observes, that as the total light of the cluster does not exceed that of a star of the 6th magnitude, it follows that several thousands of the 15th magnitude must be required to equal one of the 6th. Sir W. Herschel pronounced it to be a cluster of very compressed exceedingly small stars. This result was splendidly proved when, in September, 1799, he showed it to Professor Vince in that wonderful effort of the day, the 40ft telescope. "The scattered stars," he observes, "were brought to a good well-determined focus, from which it appears that the central condensed light is owing to a multitude of stars that appeared at various distances behind and near each other. I could actually see and distinguish the stars, even in the central mass."

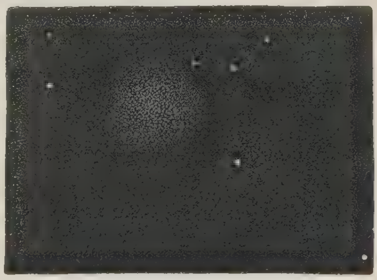

FIG. 47. 2 M. AQUARII.

In his remarks on 2 M., Sir J. Herschel says, "It is like a heap of fine sand!" The expression is remarkable, inasmuch as Cacciatore, showing me this object at Palermo in 1814, observed that the components were about as difficult to enumerate as "*l'arena della spiaggie marittime.*" This, however, is a noted method of estimating the stellar host, having been resorted to in essays, sermons, lectures, and guides to knowledge.

[Engraved, *Phil. Trans.*, 1833, Pl. viii. Fig. 88; *Phil. Trans.*, 1844, Pl. xviii. Fig. 88.]

1490. 29 B. PEGASI. (Σ. 2804.)

	h.	m.	s.		s.
R. A.	21	27	52	Prec. +	2·6
	°	′			″
Decl. N	20	13·6		—— N	15·80

	Position.		Distance.		Epoch.
	°		″		
South	311·7	...	2·58	...	1825·70
Mädler	320·8	...	2·89	...	1851·01
Plummer	325·6	...	2·96	...	1877·60

A binary star. A $7\frac{1}{2}$; B 8; both white. The angle is steadily increasing, but the observations of distance are somewhat contradictory; and it is O. Struve's opinion that it cannot be said for a certainty that the distance has altered.

1491. 39 M. CYGNI. (h. 2126; H. 4681; 𝕽.) DCCLXXXVIII.

	h.	m.	s.		s.
R. A.	21	28	15	Prec. +	2·12
	°	′			″
Decl. N	47	56·9		—— N	15·82

A loose cluster, or rather splashy galaxy field of stars, in a very rich vicinity between the Swan's tail and the Lizard, due S. of β Cephei, and E.N.E. of Deneb. This was picked up by Messier in 1764, with his $3\frac{1}{2}^{\text{ft}}$ telescope, and registered as being a degree in diameter. Among the constituents there are several pairs, of which a couple were slightly estimated; the first being the brightest star (7^{m}) and its *comes,* and the second a pretty pair of 10th magnitudes:

	Position.		Distance.		Epoch.
	°		″		
First pair	26	...	85	...	1836·72
Second pair	12	...	8		

1492. 3 PEGASI. (Σ. 56. App. I.) DCCXC.

	h.	m.	s.		s.
R. A.	21	32	14	Prec. +	2·98
	°	′			″
Decl. N	6	7·5		—— N	16·03

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	352·8	...	34·7	...	1782·76
Struve, W.	350·5	...	39·2	...	1821·54
Bellamy	349·1	...	39·2	...	1875·66
Jedrzejewicz	349·2	...	39·3	...	1878·06

A double star between the heads of Pegasus and Aquarius; the preceding of a trio about 4° to the S.S.W. of ε Pegasi. A 6, white; B 8, pale blue, and there is a small double star in the field about 5′ *np* and 8″ apart. My measures, the last of which were made in the midst of incessant electric scintillations of Aurora Borealis, countenance relative fixity.

[The colour of B is thought by C. P. Smyth to be variable.]

1493. 30 M. CAPRICORNI. DCCXCI.

(h. 2128, 3878; H. 4687; R.)

	h.	m.	s.			s.
R. A.	**21**	**34**	**7**	Prec.	+	3·43
	°	′				″
Decl.	**S 23**	**39·0**		——	N	16·13

A fine pale white cluster, under the creature's caudal fin, and about 20° W.N.W. of *α* Piscis Australis, where it precedes 41 Capricorni, a star of the 5th magnitude, within a degree to the N. This object is bright, and from the straggling streams of stars on its northern verge, has an elliptical aspect, with a central blaze; and there are but few other stars, or outliers, in the field.

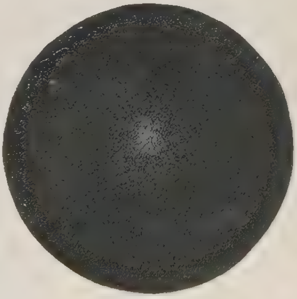

FIG. 48. 30 M. CAPRICORNI.

When Messier discovered this, in 1764, he remarked that it was easily seen with a 3½ft telescope, that it was a nebula, unaccompanied by any star, and that its form was circular. But in 1783 it was attacked by H., and forthwith resolved into a brilliant cluster, with two rows of stars, four or five in a line, which probably belong to it; and therefore he deemed it insulated. Independently of this opinion, it is situated in a blankish space, one of those chasmata which Lalande termed *d'espaces vides*, wherein he could not perceive a star of the 9th magnitude in the achromatic telescope of 67 millimètres aperture.

Here are materials for thinking! What an immensity of space is indicated! Can such an arrangement be intended, as a bungling spouter of the hour insists, for a mere appendage to the speck of a world on which we dwell, to soften the darkness of its petty midnight? This is impeaching the intelligence of Infinite Wisdom and Power, in adapting such grand means to so disproportionate an end. No imagination can fill up the picture of which the visual organs afford the dim outline; and he who confidently probes the Eternal Designs cannot be many removes from lunacy. It was such a consideration that made the inspired writer exclaim, "How unsearchable are *His* operations, and *His* ways past finding out!"

[Engraved, *Phil. Trans.*, 1833, Pl. viii. Fig. 90; Secchi, *Descrizione Osserv. Coll. Rom.*, Pl. iv. Fig. 9.]

1494. λ OCTANTIS. (*h. 5278.)

R.A.	21h	34m	7s	Prec. +	10·45s
Decl.	S 83°	13·3′		—— N	16·13″

	Position.		Distance.		Epoch.
Herschel, J.	82·9°	...	3·4″	...	1835·35

A double star. A 6; B 9.

1495. 248 P. XXI. CEPHEI. (Σ. 2816.) DCCXCII.

R.A.	21h	35m	33s	Prec. +	1·86s
Decl.	N 56°	59·5′		—— N	16·20″

		Position.		Distance.		Epoch.
Herschel, W.	A B	125·4°	...	11·5″	...	1782·74
	A C	343·9	...	18·6		
Smyth	A B	120·3	...	11·7	...	1833·83
	A C	339·5	...	19·7		
Wilson and Seabroke	A B	122·3	...	11·7	...	1873·81
	A C	339·9	...	19·8		
	A D	174·2	...	50 *est.*		

A neat triple star (with a distant companion) preceding the Æthiop's tiara or fillet, and 5½° S. by E. of α Ceti. A 6, pale yellow; B and C both 8½, and both grey; D 10. This object is thus mentioned by Piazzi: "Triplex: sociarum alia 1″ temporis parumper ad boream præcedit, et alia 1·5″ temporis sequitur parumper ad austrum: utraque 8·9$^{\text{ae}}$ magnitudinis." This note, though describing the *comites* a little more distant, still places them in the same relative position with their primary.

On the whole, the changes observable cannot be entirely attributed to orbital motions; nor, as H. remarked, can they be accounted for by supposing the stars B and C at rest, and the central star A only in motion; since it would require to have advanced eastward to suit C, but westward to suit B. Through all anomalies, here are palpable gleams of a force which penetrates through creation; and wondrous is the inference!

Those mighty orbs move through space in a curve which it bewilders the mind to figure, obediently to a mysterious impulse which binds them in affinity with some vast central phenomenon.

1496. 256 P. XXI. CEPHEI. (Σ. 2819.) DCCXCIII.

R. A.	**21h. 36m. 57s.**	Prec. + 1·86s.
Decl.	**N 57° 5′·0**	—— N 16″·27

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	58·0	...	13·1	...	1782·74
South	56·4	...	12·4	...	1825·08
Smyth	57·1	...	12·5	...	1836·79
Wilson and Seabroke	57·3	...	12·6	...	1873·81

A very neat double star closely following 248 P. XXI. previously described. A 8, white; B 9, pale violet. It may be said to show no change.

1497. ε PEGASI. DCCXCIV.

R. A.	**21h. 38m. 47s.**	Prec. + 2·94s.
Decl.	**N 9° 22′·2**	—— N 16″·37

		Position.		Distance.		Epoch.
		°		″		
Burnham	A B	325·1	...	81·5	...	1879·51
	A C	321·4	...	140·2		

A *Nautical Almanac* star, with two distant *comites*, in the mouth of Pegasus. A 2½, yellow; B 14, blue; C 9, violet; a 9th magnitude star of a violet tinge follows at a distance.

ε Pegasi is known as Enif on the Charts and Catalogues, from the Arabic word *enf*, the nose; it was also called *Fom*, or *Fam-al-faras*, the horse's lip. A line from β Cygni led over the Dolphin's rhombus, and carried as far again into the S.E. hits upon it; and the rhymester further advises:

Where Alpherat so brightly decks the captive Lady's head,
Across yon square project a ray, (south-west it must be led,)
And pass between the two first stars, so nearly north and south;
Extend beyond, twice ten degrees, and reach the Horse's mouth.

1498. μ CYGNI. (Σ. 2822.) DCCXCV.

	h. m. s.		s.
R. A.	21 39 12	Prec. +	2·65
	° ′		″
Decl.	N 28 15·0	—— N	16·39

		Position. °	Distance. ″	Epoch.
HERSCHEL, W.	A B	110·2	6·9	1779·80
SMYTH	A B	113·8	5·6	1832·79
	A C	61·5	216·0	
MÄDLER	A B	115·0	5·10	1841·60
STRUVE, O.	A B	112·4	4·78	1851·84
STRUVE, O.	A B	116·0	4·44	1861·63
DEMBOWSKI	A B	117·8	3·94	1872·85
BURNHAM	A B	118·4	3·84	1880·52
	A C	56·6	208·74	

A beautiful double star, with a distant companion in the *sf* quadrant, at the E. extreme of the asterism and between the hoofs of Pegasus, 19° due N. of ε Pegasi. A 5, white; B 6 and C 7½, both blue.

An occult spacial movement may be accountable for the changes shown, since proper motions have been detected in A, in which it is probable that B partly partakes.

[“The small star C does not belong to the system.”—*Gledhill.* Burnham has noted a companion of the 12th mag. in Pos. 262°; Dist. 35″; Epoch 1877·71.]

1499. κ PEGASI. (Σ. 2824.) DCCXCVI.

	h. m. s.		s.
R. A.	21 39 39	Prec. +	2·71
	° ′		″
Decl.	N 25 8·3	—— N	16·41

	Position. °	Distance. ″	Epoch.
STRUVE, W.	308·5	11·0	1831·56
MÄDLER	306·3	11·6	1851·00
GLEDHILL	302·5	12·1	1874·80
BURNHAM	303·1	11·7	1880·60

A very delicate double star in the right fetlock of Pegasus, and 16° N. of ε Pegasi, where it is closely followed by two small stars on the parallel; but the vicinity is otherwise barren. A 4, pale white; B 13, purple.

[A slight decrease of angle seems probable, but it may be due to proper motion. A was found by Burnham in 1880 to be an excessively close double. He gives, Pos. 137·9°; Dist. 0·27″; Epoch 1880·68.]

1500. 258 P. XXI. [μ] CEPHEI. DCCXCVII.

	h.	m.	s.			s.
R. A.	21	40	8	Prec.	+	1·83
Decl.	N	58°	16′·5	——	N	16″·44

		Position.		Distance.		Epoch.
Burnham	A B	259°·8	...	19″·3	...	1878·48
	A C	299·4	...	41·2		

A richly coloured star with 2 companions, in the preceding part of the Monarch's anadema, and 5° to the S.S.E. of *α* Ceti. A 6, deep orange tint; B [12]; C and other small stars in the field. Piazzi has entered A in his Catalogue under the designation *Garnet Sidus*, saying, "Stellam hanc rubei sub obscuri coloris primum apparuisse supponitur circa annum 1782." This is derived from Sir W. Herschel's luminous paper on the proper motion of the Sun and the Solar System in the *Phil. Trans.*, 1783, wherein he mentions that it was not marked by Flamsteed. He further observes, "It is of a very fine deep garnet colour, such as the periodical star *o* Ceti was formerly, and a most beautiful object, especially if we look for some time at a white star before we turn our telescope to it, such as *α* Cephei, which is near at hand."

[Variable, but period altogether uncertain; some authorities say $1\frac{1}{4}^{\text{y}}$; others 5$^{\text{y}}$ or more. Range of magnitude, 4–6.]

1501. 75 H. IV. CEPHEI. (h. 2131; H. 4702; ℜ.)

	h.	m.	s.			s.
R. A.	21	40	26	Prec.	+	1·38
Decl.	N	65°	35′·9	——	N	16″·45

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:— "!; c F; p L; gb M ⁂;" which means:—"a remarkable object; considerably faint; pretty large; gradually brighter in the middle where there is a triple star."

1502. 8912 Lac. GRUIS.

	h.	m.	s.			s.
R. A.	21	41	7	Prec.	+	3·94
Decl.	S	47°	47′·6	——	N	16″·48

	Position.		Distance.		Epoch.
Herschel, J.	14°·2	...	30″·3	...	1836·6

A double star. A 6; B 10.

1503. 66 H. VII. CEPHEI. (h. 2134; H. 4709; R.)

	h.	m.	s.		s.
R. A.	**21**	**43**	**17**	Prec. +	1·44
		°	′		″
Decl.	**N**	**65**	**18·0**	—— N	16·59

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; c L; c Ri; p C; st 11 ... 14;" which means:—"a cluster; considerably large; considerably rich; pretty compressed; the component stars vary from the 11th to the 14th magnitudes."

1504. 3894 h. GRUIS. (H. 4711.)

	h.	m.	s.		s.
R. A.	**21**	**45**	**31**	Prec. +	3·92
		°	′		″
Decl.	**S**	**48**	**46·2**	—— N	16·71

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"v B; p S; R; mb M N;" which means:—"very bright; pretty small; round; much brighter in the middle where there is a nucleus."

1505. 312 P. XXI. PEGASI. DCCXCVIII.

	h.	m.	s.		s.
R. A.	**21**	**46**	**24**	Prec. +	2·81
		°	′		″
Decl.	N	**19**	**18·7**	—— N	16·74

		Position.		Distance.		Epoch.
		°		″		
Burnham	A B	93·1	...	20·0	...	1879·54
	A C	325·8	...	24·1		

A most delicate triple star, in a barren field, between the head and shin of Pegasus, and about 10° N. by E. of ε Pegasi. A 6½, white; B [11; C 12]. B, though best seen with an averted eye, was plain enough at times, even under a slight illumination.

1506. 147 B. CEPHEI. (Σ. 2840.)

	h.	m.	s.		s.
R. A.	**21**	**48**	**17**	Prec. +	2·01
		°	′		″
Decl.	**N**	**55**	**16·8**	—— N	16·83

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	194·0	...	20·0	...	1832·96
Mädler	194·8	...	19·2	...	1852·20
Dunér	194·5	...	19·4	...	1868·49
Gledhill	194·9	...	20·1	...	1874·91

A double star. A 6, greenish white; B 7½, bluish white. The measures clearly indicate fixity.

1507. 3900 h. PISCIS AUSTRALIS. (H. 4716.)

	h.	m.	s.			s.
R. A.	21	48	45	Prec.	+	3·59
		°	′			″
Decl.	S	35	20·0	——	N	16·86

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; p L; i R; glb M; r;" which means:—"bright; pretty large; irregularly round; gradually less bright in the middle; hardly resolveable—mottled as if with stars."

1508. 100 B. AQUARII. (Σ. 2838.)

	h.	m.	s.			s.
R. A.	21	48	52	Prec.	+	3·12
		°	′			″
Decl.	S	3	49·2	——	N	16·86

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	185·1	...	21·6	...	1829·47
Stone, O.	184·0	...	20·3	...	1878·72

A double star. A 6, yellowish; B 9½.

1509. 42827 Lalande PEGASI. (Σ. 2848.)

	h.	m.	s.			s.
R. A.	21	52	30	Prec.	+	3·01
		°	′			″
Decl.	N	5	25·0	——	N	17·03

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	54·8	...	10·4	...	1829·41
Dawes	55·9	...	10·6	...	1840·87
Dunér	56·0	...	10·6	...	1868·49

A double star. A 8, white; B 8½, yellowish or red.

1510. 2141 h. CEPHEI. (H. 4732; 𝕽.)

	h.	m.	s.			s.
R. A.	21	54	59	Prec.	+	2·10
		°	′			″
Decl.	N	54	17·7	——	N	17·14

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; p Ri; l C;" which means:—"a cluster; very large; pretty rich; little compressed."

1511. 3908 h. PISCIS AUSTRALIS. (H. 4729.)

R.A.	**21h 55m 37s**	Prec.	+ 3s·51
Decl.	**S 32° 24′·0**	——	N 17″·17

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"pB; pL; 1E; gbM; 1st of 4;" which means:—"pretty bright; pretty large; not much extended; gradually brighter in the middle; the 1st of 4 nebulæ all near one another." The others follow at intervals of 1^s, 3^s, and 7^s respectively, and are all about 5′ to the S. of the 1st.

1512. 20 PEGASI. DCCXCIX.

R.A.	**21h 55m 43s**	Prec.	+ 2s·91
Decl.	**N 12° 35′·6**	——	N 17″·18

	Position. °	Distance. ″	Epoch.
Burnham	325·9	50·9	1879·57

A most delicate double star, close to the animal's cheek, 5° E.N.E. of ε Pegasi, and 15° W. by S. of α Pegasi. A 5½, lucid white; B 14, blue; several glimpse stars in the field. This is a less difficult object than 312 P. XXI., which was turned upon after the data here given had been estimated, as a preparation.

1513. 29 AQUARII. (Σ. 802.) DCCC.

R.A.	**21h 56m 25s**	Prec.	+ 3s·29
Decl.	**S 17° 29′·7**	——	N 17″·21

	Position. °	Distance. ″	Epoch.
Struve, W.	243·5	4·5	1823·19
Smyth	242·2	4·2	1852·73
Stone, O.	243·4	3·6	1879·46

A beautiful double star on the tail of Capricorn, 4° E. by S. of the bright star δ Capricorni, and 17° S. ¼ W. of α Aquarii. A 6 and B 8, both brilliant white; and they are followed at a distance by a star nearly on the parallel. The action of the telescope on these stars was considerably improved by the application of a central paper disc upon the object-glass, of two inches in diameter, as the images came up *cleaner*.

[Webb remarks that there is very little difference in the size of these stars; and Knott to the same effect, 1862; he puts both at about 6¾ or 7.]

1514. α AQUARII. DCCCI.

R.A. $22^{h}\ 0^{m}\ 8^{s}$ | Prec. + $3^{s}{\cdot}08$
Decl. S $0^{\circ}\ 51'{\cdot}2$ | —— N $17''{\cdot}37$

	Position.		Distance.		Epoch.
BURNHAM	$41^{\circ}{\cdot}5$	...	$114''{\cdot}2$	...	1879·51

A *Nautical Almanac* star, with a minute companion, on the Water-bearer's left shoulder. A 3, pale yellow; B 13, grey; and the two point nearly upon another telescopic star in the *sp* quadrant. α Aquarii is called Sadalmelik, properly *Sa'd-al-melik*, the king's lucky star; but others read *Sa'd-al-mulk*, the lucky star of the kingdom. A line from α Andromedæ led through α Pegasi, and carried as far again into the S.W., hits it. The rhymester here observes:

From Scorpio, to where Aries shines, you catch no brilliant ray,
Through twice two interjacent signs, to mark your trackless way;
Yet would you know where, from his urn Aquarius pours the stream,
From fair Andromeda descend, o'er Markab's friendly beam.
Or from bright Wega cast your glance, and through the Dolphin's space,
Then just as far again you'll find, the Water-bearer's place.

ʽΥδροχόος, Hydrochoos, Aquarius, Stellæ effusoris aquæ, Juvenis, and Ganymede, are among the names which the classical ancients gave to the Water-bearer. Although from its possessing no star larger than of the 3rd magnitude this asterism is not a very conspicuous one, yet its double stars, clusters, and nebulæ, together with its being the XIth sign in the zodiac, give it great astronomical importance. The catalogues of its components have successively run thus:

Ptolemy . . .	45 stars.	Hevelius . .	48 stars.
Copernicus . .	45 „	Flamsteed . .	108 „
Tycho Brahé . .	41 „	Bode	343 „

In the Arabo-Latin Almagest this constellation appears as Indrodurus; but the Arabians called it *Sákib el-má*, the water-drawer. It had immemorially been represented as a man pouring water from a vase; but as Moslems are forbidden to draw the human figure, the Arabs represented this sign by a saddled mule, carrying on his back two water-barrels. Is it not written, in the before-cited Almanack of 1386, that in Aquarius "it es gode to byg castellis, and to wed, and lat blode"? Does not the *Ysagogicus* of Alchabitus, 1485, gravely assure us, that when Saturn is in Aquarius, he has man completely in his clutches, "caput et collũ habet"? and Jupiter in the same sign "humeros, pect.' et pedes"? And all the authorities clearly show, that when this asterism appears in the horizon the weather invariably proves rainy. These *facts* being supported by reasoning deemed both logical and conclusive, let no one scepticize.

1515. ξ CEPHEI. (Σ. 2863.) DCCCII.

	h. m. s.		s.
R. A.	22 0 35	Prec. +	1·70
	° ′		″
Decl.	N 64 5·4	—— N	17·39

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	290·3	...	5·0	...	1779·85
Smyth	289·5	...	5·6	...	1830·91
Mädler	287·2	...	5·7	...	1845·57
Mädler	287·3	...	6·2	...	1861·80
Gledhill	284·8	...	6·6	...	1874·91

A splendid double star in the right axilla of Cepheus, being the upper member of a vertical line of small stars, E.N.E. of α, and S.S.E. of β Cephei. A 5 and B 7, both bluish. A comparison of the various observations indicates a small increase in distance.

1516. 53 ♅. VII. LACERTÆ. (h. 2147; H. 4755; ℟.)

	h. m. s.		s.
R. A.	22 0 53	Prec. +	2·38
	° ′		″
Decl.	N 45 57·1	—— N	17·41

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; c Ri; p C; st 9...12;" which means:—"a cluster; large; considerably rich; pretty condensed; the component stars range from the 9th to the 12th magnitudes."

1517. 180 B. CEPHEI. (Σ. 2873.)

	h. m. s.		s.
R. A.	22 2 20	Prec. −	1·57
	° ′		″
Decl.	N 82 20·5	—— N	17·51

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	77·3	...	13·8	...	1832·30
Main	74·1	...	13·3	...	1864·64
Jedrzejewicz	74·8	...	13·6	...	1880·08

A double star. A 6½, white; B 7½, white.

1518. 3924 h. GRUIS. (H. 4757.)

	h. m. s.		s.
R. A.	22 2 23	Prec. +	3·80
	° ′		″
Decl.	S 47 41·9	—— N	17·48

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—

"v B; p S; R; gb M;" which means:—"very bright; pretty small; round; gradually brighter in the middle."

1519. 11 P. XXII. CEPHEI. (Σ. 2872.) DCCCIV.

	h.	m.	s.		s.
R.A.	22	4	52	Prec. +	2·01
	°	′			″
Decl. N	58	45·3		—— N	17·58

		Position.		Distance.		Epoch.
		°		″		
Herschel, J., and South		315·2	...	20·1	...	1823·74
Smyth	AB	316·8	...	21·4	...	1839·77
	BC	150·0	...	0·5		
Struve, O.	AB	316·4	...	21·7	...	1851·24
Secchi	BC	328·3	...	0·4	...	1856·95
Dembowski	BC	325·9	...	0·5	...	1867·65
Burnham	BC	326·0	...	0·59	...	1880·59

A fine double star on the following part of the Æthiop's diadem, in a little group to the S.E. of *α* Cephi, and on the parallel of *β* Cassiopeiæ. A 6, and B 6½, both white; b 7, pale; and there are two very minute stars in the *sf* quadrant, the nearest being close to the vertical.

He who fishes for this test, must bear in mind that Σ. 2810 precedes it on the parallel by 30^{m}, and the two objects are so similar in lustre, colour, and mutual relation, that though they are wide apart, a mistake might occur.

1520. 9046 Lac. PISCIS AUSTRALIS. (β. 769.)

	h.	m.	s.		s.
R.A.	22	5	11	Prec. +	3·4
	°	′			″
Decl. S	35	0·1		—— N	17·63

	Position.		Distance.		Epoch.
	°		″		
Burnham	348·6	...	0·6 ±	...	1879·69

A double star. A 7; B 8. Discovered to be double by Burnham at Mount Hamilton in California.

1521. 189 B. CEPHEI. (Σ. 2883.)

	h.	m.	s.		s.
R.A.	22	8	8	Prec. +	1·39
	°	′			″
Decl. N	69	35·7		—— N	17·71

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	254·7	...	14·8	...	1833·06
Main	254·1	...	14·6	...	1864·65

A double star. A 6½, bluish white; B 9, blue.

1522. 41 AQUARII. DCCCV.

	h.	m.	s.		s.
R. A.	22	8	14	Prec. +	3·33
		°	′		″
Decl.	S	21	37·3	—— N	17·72

	Position.	Distance.	Epoch.
	°	″	
Herschel, J., and South	120·7	5·1	1823·75
Smyth	119·4	4·8	1830·71
Main	117·8	4·8	1861·84
Stone, O.	116·6	5·1	1877·70

A beautiful double star between the Water-bearer and the Southern Fish; it is nearly in a line between α Piscis Australis and δ Capricorni, and 1½° to the W.N.W. of 47 Aquarii, a star of the 5th magnitude. A 6, topaz yellow; B 8½, cerulean blue.

1523. 148 B. PEGASI. (Σ. 2878.)

	h.	m.	s.		s.
R. A.	22	9	0	Prec. +	2·99
		°	′		″
Decl.	N	7	25·7	—— N	17·75

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	130·8	1·36	1830·31
Mädler	134·7	1·38	1851·82
Wilson and Seabroke	132·2	1·45	1875·92

A double star. A 7, white; B 8½, white.

1524. 33 P. XXII. PEGASI. (Σ. 2877.) DCCCVI.

	h.	m.	s.		s.
R. A.	22	9	1	Prec. +	2·88
		°	′		″
Decl.	N	16	38 9	—— N	17·75

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	316·4	7·6	1828·9
Struve, O.	333·7	8·6	1851·90
Gledhill	348·5	10·0	1873·79
Struve, O.	350·1	10·2	1874·7

A very delicate double star in the space between the head and legs of Pegasus, 10° from ε towards β, or rather less than half way. A 7½, lucid yellow; B 10½, sea-green; and there are 4 small stars forming a curve below, or N. of it. This is a beautiful object.

Small as is the acolyte of this object, its emerald tinge is very marked; and, from snatches made while the larger one was behind a thick wire, it can hardly be entirely the effect of contrast.

[The movement is rectilinear and uniform."—*Gledhill.*]

1525. 2893 Σ. CEPHEI.

	h. / °	m. / ′	s.			s. / ″
R. A.	22	10	54	Prec.	+	1·11
Decl.	N 72	45·8		——	N	17·82

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	348·6	28·8	1833·58
MAIN	348·8	29·6	1864·65
STONE, O.	347·6	28·8	1879·50

A double star. A 6, yellowish; B 8, white. About midway between β and γ.

1526. 75 Ḩ. VIII. LACERTÆ. DCCCVII.

(h. 2155; H. 4773; R.)

	h. / °	m. / ′	s.			s. / ″
R. A.	22	11	57	Prec.	+	2·36
Decl.	N 49	19·9		——	N	17·86

A large and loose cluster of stars from the 9th to the 14th magnitudes, on the Lizard's mouth; where a line carried from the Pole-star through the tiara of Cepheus, and led 8° further, strikes it. A neat double star forms the vertex of a telescopic triangle near the middle of the group. Ḩ. described it as 16′ in length from *sp* to *nf*, but the whole vicinity is very rich, especially to the N. The double star here mentioned is Σ. 2890, "in acervo."

["Fine cluster, quickly followed by beautiful field with 3 pairs."—*Webb.*]

1527. 65 P. XXII. LACERTÆ. (Σ. 2894.) DCCCVIII.

	h. / °	m. / ′	s.			s. / ″
R. A.	22	14	6	Prec.	+	2·61
Decl.	N 37	13·0		——	N	17·95

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, J., and SOUTH	191·3	15·6	1823·72
SMYTH	193·4	15·2	1835·84
DUNÉR	193·5	15·6	1868·34
WILSON, &c.	194·9	15·4	1874·85

A neat double star on the tip of the creature's tail; a line led N.N.W. from α Pegasi to the W. of η, and about 10° beyond, will find it following 1 Lacertæ, a 5th mag. star. A 6½, pale white; B 9, livid. The *fixity* of this, as an optical object, may be regarded as certain.

1528. γ AQUARII. DCCCIX.

	h. m. s.		s.
R. A.	**22 15 58**	Prec.	+ 3·09
	° ′		″
Decl.	**S 1 56·5**	——	N 18·02

	Position.	Distance.	Epoch.
	°	″	
Smyth	130·3	40·0	1834·70
Lamont	125·9	49·4	1838·8
Burnham	129·6	43·8	1878·72

A very delicate but wide double star on the Water-bearer's left arm, and 4° E. by S. from α Aquarii. A 4, greenish tinge; B 14, purple, but though so minute it is fairly seen under the action of the rock-crystal micrometer.

γ Aquarii is the Sadachbia of the Palermo and other Catalogues: the epithet is derived from the Arabian *sa'd-al akhbiyah*, the lucky star of hidden things, or hiding-places, because, when it appears, the earth-worms creep out of their holes.

Padre de Rheita, an early improver of telescopes, thought he perceived 5 satellites attending upon Jupiter when in this vicinity, whereupon, in compliment to the reigning pontiff, he dubbed them "the stars of Urban Octavus;" and the fact was announced in a Latin treatise by C. Lobkowitz, in 1643, *De novem Stellæ circa Jovem*, with the appropriate motto, *Consideravi opera Tua, et expavi.* The planet, however, soon deserted his companions, and the stars proved to be the little group in front of the Urn. So poor De Rheita took nothing by his motion; but after thus complimenting the Pope, and discovering Sta. Veronica's *sudarium* (see No. 628 *ante*), though he was called to Rome by the Superior of his Order, he died a simple Capuchin, in 1660, at the age of 63.

1529. 2159 h. CEPHEI. (H. 4783.)

	h. m. s.		s.
R. A.	**22 16 27**	Prec.	+ 2·15
	° ′		″
Decl.	**N 57 32·2**	——	N 18·04

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; p Ri; l C;" which means:—"a cluster; large; pretty rich; not much compressed."

1530. 2 LACERTÆ. DCCCX.

	h. m. s.		s.
R. A.	**22 16 28**	Prec.	+ 2·46
	° ′		″
Decl.	**N 45 43·9**	——	N 18·04

	Position.		Distance.		Epoch.
	°		″		
Burnham	9·9	...	47·9	...	1879·49

A delicate but wide double star on the Lizard's shoulder, where a line from Polaris carried by the E. of Cepheus's tiara, and 11° further, will find it the *lucida* of a fine galaxy field. A 5, pale yellow; B [11], orange tint; 3 other stars in the *sf.* As the *comes* defied illumination, the above were mere estimations.

Lacerta, *vel* Stellio, is a little constellation formed by Hevelius at Dantzig, 160 years ago. As some of the *informes* between Andromeda and Cygnus were of the 5th magnitude, he thought they needed an intelligible designation, and therefore gathered 10 of the brightest, and made his Lizard; the place being too narrow for any other description of animal. But he figured it as a strange weasel-built creature with a curly tail, the which was copied by Flamsteed. Very like a lizard! Seeing the kind of space it occupied, Royer wished to place the sceptre of his sovereign, Louis XIV., in its stead, but the reptile prevailed. The components have been thus numbered:

Hevelius	10 stars.	Piazzi	37 stars.
Flamsteed . . .	16 „	Bode	60 „

1531. 33 PEGASI. (Σ. 2900.) DCCCXI.

R. A.	$22^{h.}$ $18^{m.}$ $21^{s.}$	Prec.	+ $2^{s.}$·88
Decl.	N 20° 17′·5	——	N 18″·11

		Position.		Distance.		Epoch.
		°		″		
Herschel, J., and South		345·7	...	56·0	...	1823·71
Smyth	A B	181·6	...	2·7	...	1831·74
	A C	344·0	...	56·9		
Dembowski	A B	177·6	...	2·25	...	1863·25
	A C	334·1	...	60·5		
Gledhill	A B	176·2	...	1·88	...	1874·91
	A C	331·9	...	63·3		

A triple star preceding the chest of Pegasus, and nearly midway between β and ϵ, where it is the leader of 6 stars of similar size, lying in a line. A 6½, yellowish; B 10, blue; C 8, pale grey.

In reviewing this object, Struve detected the close companion to A, and enrolled it in the Dorpat Catalogue. But my attention was first drawn to it by Dawes, who had accomplished its measurement at Ormskirk, with a 5^{ft} telescope; which rendered its escaping the searching eye of Ħ. the more remarkable.

The *prima facie* evidence of the apparent rotation of A and C was supported by my observations; and that there is a physical connection among the components is certain. [Gledhill puts the matter thus:—"AB are probably a physical pair, while the changes in AC are due to the proper motion of A."]

1532. δ TOUCANI. (*h. 5334.)

	h.	m.	s.		s.
R. A.	**22**	**19**	**31**	Prec. +	4·39
		°	′		″
Decl.	**S**	**65**	**31·9**	—— N	18·16

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	282·3	...	6·8	...	1836·07
Santiago Obs.	252·2	...	5·9	...	1850·68

A double star. A 5; B 10.

1533. 53 AQUARII. DCCCXII.

	h.	m.	s.		s.
R. A.	**22**	**20**	**34**	Prec. +	3·25
		°	′		″
Decl.	**S**	**17**	**18·0**	—— N	18·20

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	303·1	...	10·0	...	1823·26
Stone, O.	304·7	...	7·8	...	1877·7

A neat double star on the Water-bearer's right thigh, and about 14° N.N.W. of α Piscis Australis. A and B, 6½, and both pale white. This is a beautiful object.

The change in the distance may be owing to proper motions.

1534. 2161 h. CEPHEI. (H. 4791.)

	h.	m.	s.		s.
R. A.	**22**	**20**	**45**	Prec. +	2·20
		°	′		″
Decl.	**N**	**57**	**16·7**	—— N	18·21

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; L; p Ri; l C; st 10 . . . 16;" which means:—"a cluster; large; pretty rich; little compressed; the component stars range from the 10th to the 16th magnitudes."

1535. ζ AQUARII. (Σ. 2909.) DCCCXIII.

	h.	m.	s.			s.
R. A.	**22**	**23**	**9**	Prec.	+	3·08
		°	′			″
Decl.	**S**	**0**	**35·0**	——	N	18·29

	Position.		Distance.		Epoch.
	°		″		
Herschel, W.	18·3	...	4·56	...	1779·70
Struve, W.	358·3	...	4·40	...	1820·92
Smyth	356·0	...	3·6	...	1831·83
Smyth	348·9	...	2·7	...	1842·59
Struve, W.	349·5	...	3·77	...	1851·89
Mädler	340·4	...	3·63	...	1861·81
Dembowski	336·4	...	3·31	...	1871·59
Doberck	333·9	...	3·26	...	1878·80
Stone, O.	332·2	...	3·23	...	1879·50

A binary star on the Water-bearer's left wrist, about 6° distant from Sadalmelik, on its E. parallel; where it is in the middle of 3 other stars, which altogether form a figure resembling the letter Y. A 4, very white; B 4½, white. This is a fine object. In 1804 H̥. perceived that the components were physically connected.

[Doberck has assigned a period of 1578$^{\text{y}}$.]

1536. 37 PEGASI. (Σ. 2912.) DCCCXIV.

	h.	m.	s.			s.
R. A.	**22**	**24**	**24**	Prec.	+	3·03
		°	′			″
Decl.	**N**	**3**	**52·5**	——	N	18·34

	Position.		Distance.		Epoch.
	°		″		
Struve, W.	112·6	...	1·16	...	1831·12
Smyth	116·8	...	1·3	...	1835·81
Dawes	116·2	...	1·10	...	1843·87
Mädler	126·3	...	0·67	...	1851·85
Dawes	119·8	...	*not given*	...	1860·70
Burnham	130·0	...	0·32	...	1878·63
Burnham	...	...	*single*	...	1880·59

A [double] star on the mane, and near the animal's head: it is the following of 3 small stars which Hevelius termed a nebula, 7° to the E.N.E. of *α* Aquarii, where it is struck by a line from *α* Andromedæ through *α* Pegasi. A 6 and B 7½, both white. This close and beautiful object was discovered by Σ., who registered it as one of the 1st class "pervicinæ." It is clear that the angle is undergoing change, [but the measures are by no means very consistent. The distance is certainly diminishing. Burnham writes: "Very difficult."]

1537. 2913 Σ. AQUARII.

		h.	m.	s.		s.
R. A.		22	24	45	Prec. +	3·16
		°	′			″
Decl.	S	8	40·7		—— N	18·35

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	331·9 ...	8·0 ...	1830·85
Dunér	329·4 ...	7·9 ...	1868·59

A double star. A 7½, white; B 8½, reddish. Doubtless the components are fixed.

1538. δ CEPHEI. (Σ. 58 App. I.) DCCCXV.

		h.	m.	s.		s.
R. A.		22	25	5	Prec. +	2·20
		°	′			″
Decl.	N	57	51·1		—— N	18·36

		Position.	Distance.	Epoch.
		°	″	
Herschel, J., and South	A C	191·3 ...	41·6 ...	1822·87
Main	A C	192·0 ...	40·3 ...	1866·54
Jedrzejewicz	A C	191·7 ...	40·8 ...	1878·56
Burnham	A B	285·7 ...	19·3 ...	1880·65

A fine though wide double star closely following the monarch's tiara, where a line led E.S.E. from α, till it cuts the W. or preceding parallel of β Cassiopeiæ, strikes it. A 4½, orange tint; [B 13;] C 7, fine blue; the colours, under proportionately magnifying powers, being in fine contrast.

At first sight, proper motion might be thought to interfere, but there is great reason to conclude that both components are similarly affected.

δ Cephei was discovered to be variable by Goodricke. It is so slightly variable that the changes are not easily seen, unless at its maximum and minimum brightness.

[The period is $5^d\ 8^h\ 47^m$, and the range from mag. 3½ to mag. 4½. The interval between the maximum and the minimum is $3^d\ 19^h$, but between the minimum and the maximum it is only $1^d\ 14^h$.]

1539. β PISCIS AUSTRALIS.

		h.	m.	s.		s.
R. A.		22	25	15	Prec. +	3·44
		°	′			″
Decl.	S	32	54·2		—— N	18·37

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	173·3 ...	29·1 ...	1836·25

A double star. A 5; B 9.

1540. α LACERTÆ. (β. 703.)

	h.	m.	s.		s.
R. A.	22	26	44	Prec. +	2·44
		°	′		″
Decl.	N	49	43·0	—— N	18·41

	Position.		Distance.		Epoch.
	°		″		
Burnham	298·8	...	30·1	...	1878·02

A 4th mag. star with a very faint companion of the 12th mag. (*Burnham.*) This star "points out a noble field." About 1° *sp* is 4 Lacertæ, a 5th mag. star, "deep orange with a blue attendant, in a rich field." (*Webb.*)

1541. σ² GRUIS. (β. 771.)

	h.	m.	s.		s.
R. A.	22	30	32	Prec. +	3·54
		°	′		″
Decl.	S	41	9·9	—— N	18·58

	Position.		Distance.		Epoch.
	°		″		
Burnham	270 ±	...	1·3 ±	...	1879·64

A double star. A 6; B 10½. Discovered to be double by Burnham at Mount Hamilton, in California. He calls it "a beautiful pair under favourable conditions."

1542. 8² LACERTÆ. (Σ. 2922.) DCCCXVI.

	h.	m.	s.		s.
R. A.	22	30	58	Prec. +	2·65
		°	′		″
Decl.	N	39	3·9	—— N	18·56

		Position.		Distance.		Epoch.
		°		″		
Dunér	AB	185·8	...	22·3	...	1868·51
	BC	155·0	...	28·0	...	1868·85
	BD	131·2	...	66·9	...	1868·51
Burnham	AB	185·9	...	22·3	...	1880·08
	BC	155·0	...	27·9	...	1880·77
	AD	144·4	...	81·5	...	1880·08
	BD	131·2	...	66·5		

A quadruple star, forming, as H̥. remarked, an arch, in the Lizard's tail; it is the preceding component of a neat triangle, upwards of 20° N.W. of *a* Andromedæ. A and B 6½, and both white; C 11, greenish; D 10, blue; and there is a fifth star away in the *sp* quadrant.

The fixity of the object appears unquestionable. The following of the two principal stars is designated A, for though Piazzi makes them both of equal magnitude, it is certainly brighter than the preceding one.

1543. 53 H. I. PEGASI. (h. 2172; H. 4815; R.)

	h.	m.	s.		s.
R. A.	22	32	0	Prec. +	2·73
	°	′			″
Decl.	N 33	49·2		—— N	18·60

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; pL; pmE 160°; smbM;" which means:—"bright; pretty large; pretty much extended in the direction of 160° with the meridian; suddenly much brighter in the middle."

Engraved, Rosse, *Phil. Trans.*, 1861, Pl. xxx. Fig. 39.

1544. 10 LACERTÆ. DCCCXVII.

	h.	m.	s.		s.
R. A.	22	34	19	Prec. +	2·67
	°	′			″
Decl.	N 38	28·7		—— N	18·67

	Position.	Distance.	Epoch.
	°	″	
SOUTH	48·7 ...	60·4 ...	1825·12
SMYTH	48·2 ...	58·9 ...	1830·73

A wide double star at the root of the reptile's tail, and the S.E. component of the triangle above described. A 6½, white; B 10, violet. This appears to be stationary.

Here Bode introduced a bit of flattery, in 1787, to immortalize Frederick II. of Prussia. He published a drawing of the *Honores Frederici* in his *Jahrbuch* for 1790; the crown, the laurel, the sword, the pen, as typifying the monarch, the hero, the sage, and the pacificator. It has already passed from the skies!

1545. 2177 h. CEPHEI. (H. 4826; R.)

	h.	m.	s.		s.
R. A.	22	35	24	Prec. +	2·33
	°	′			″
Decl.	N 56	49·3		—— N	18·71

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; vL; pRi; vlC;" which means:—"a cluster; very large; pretty rich; very little compressed."

1546. ζ PEGASI. DCCCXVIII.

	h.	m.	s.		s.
R. A.	22	35	58	Prec. +	2·98
	°	′			″
Decl.	N 10	15·5		—— N	18·72

	Position.	Distance.	Epoch.
	°	″	
BURNHAM	137·8 ...	64·3 ...	1879·54

A *Nautical Almanac* star, with a minute *comes*, on the middle of the animal's neck; where a line from *a* Andromedæ passed over *a* Persei, and led 7° further to the S.W., reaches it. A 3, light yellow; B 13, dusky; and there are 3 other telescopic stars in the field, under a moderate magnifying power.

ζ Pegasi is designated Homam in the Palermo and other Catalogues, from *Sa'd al-homám*, the hero's happy star, of the Arabians.

1547. 200 P. XXII. AQUARII. (Σ. 2935.) DCCCXIX.

	h. m. s.		s.
R. A.	22 37 17	Prec. +	3·15
Decl.	S 8° 53′·2	—— N	18″·76

	Position.		Distance.		Epoch.
Herschel, J., and South	321°·3	...	3″·4	...	1823·70
Smyth	313·8	...	2·7	...	1838·69
Dunér	314·0	...	2·5	...	1870·29

A very neat double star in the streamlet at the mouth of the Water-bearer's vase, and 19° S. of ζ Pegasi. A 7, and B 8½, both white.

This may turn out to be a physical object, though a long interval of time will be required to prove it such.

[Webb calls B "bluish," and Knott confirms him.]

1548. η PEGASI.

	h. m. s.		s.
R. A.	22 37 50	Prec. +	2·80
Decl.	N 29° 38′·7	—— N	18″·78

	Position.		Distance.		Epoch.
South	338°·9	...	89″·8	...	1824·8

A 3rd mag. star with a 10th mag. companion, noted by Webb as forming a combination resembling ε, but the large star of a paler yellow. Schmidt thinks its tint variable, more white or red in different years. η Pegasi lies about 5° *np* β in the same constellation.

1549. 209 P. XXII. AQUARII. (Σ. 2939.) DCCCXX.

	h. m. s.		s.
R. A.	22 39 34	Prec. +	3·16
Decl.	S 10° 13′·4	—— N	18″·83

	Position.		Distance.		Epoch.
Smyth	63°·5	...	10″	...	1834·68

A very delicate double star between the streamlet and the Water-bearer's left thigh, and 1½° S. ½ E. from 200 P. XXII., previously described. A 8, white; B 12½, violet tint.

1550. ξ PEGASI. DCCCXXI.

R.A.	22h 41m 11s	Prec. + 2s·98
Decl.	N 11° 37′·1	—— N 18″·89

		Position.	Distance.	Epoch.
Smyth	A B	120°·0	15″	1834·97
	A C	32·5	110	
Dembowski	A B	117·7	12·2	1866·80
Burnham	A B	112·0	11·9	1878·62
	A C	21·8	127·3	1879·52

A delicate double star, with a distant companion, on the animal's neck; within a couple of degrees N.E. by N. of ζ before aligned. A 5, pale yellow; B 15, blue; C 12, dusky. As the *comes* is only to be caught under intense gazing, with the most favourable circumstances of atmosphere and instrument, I added C for identification. Sir J. Herschel rated B of the 18th magnitude, but it certainly is not my *minimum visibile:* he observes, that it bears illumination well, and is *therefore* blue.

["Very delicate, but easily seen in 7½in refractor with power 106 in 1857."—*Brodie.*]

1551. τ¹ AQUARII. (Σ. 2943.) DCCCXXII.

R.A.	22h 41m 52s	Prec. + 3s·19
Decl.	S 14° 38′·2	—— N 18″·90

	Position.	Distance.	Epoch.
South	112°·8	30″·5	1825·21
Smyth	113·5	29·7	1838·67
Dembowski	114·6	28·5	1864·48
Cincinnati Obs.	114·9	28·3	1877·80

A fine double star above the Water-bearer's left knee, and nearly midway of a line between α Piscis Australis and ζ Pegasi. A 6, white; B 9½, pale garnet.

There appears to be evidence of a progressive increase of angle and of diminution of distance. But the star is difficult.

1552. 219 P. XXII. AQUARII. (Σ. 2944.) DCCCXXIII.

R.A.	22h 42m 10s	Prec. + 3s·11
Decl.	S 4° 47′·8	—— N 18″·91

		Position.	Distance.	Epoch.
		°	″	
HERSCHEL, J., and SOUTH	A B	245·6	4·3	1822·90
	A C	162·5	57·3	
SMYTH	A B	247·4	4·2	1835·88
	A C	158·0	55·1	
DEMBOWSKI	A B	250·4	3·6	1862·68
	A C	146·7	50·6	
BURNHAM	A B	252·8	3·8	1878·73
	A C	140·8	48·6	

A triple star following κ, at the mouth of the vase, by about 2½° on its E. parallel; and it is two-thirds of the way from α Piscis Australis towards ζ Pegasi. A 7½, yellow; B 8, and C 9, flushed white.

[There appears to be an increase in the angle of A B, and a decrease in the angle of A C. The measures of distance of A B are not very harmonious, but the distance of A C is certainly diminishing.]

1553. 77 H. VIII. CEPHEI. (h. 2182; H. 4842; R.)

	h. m. s.		s.
R. A.	**22 42 34**	Prec. +	2·37
	° ′		″
Decl.	**N 57 30·3**	—— N	18·92

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; p L; p Ri; l C; st 9 ... 13;" which means:—"a cluster; pretty large; pretty rich; not much compressed; the component stars range from the 9th to the 13th magnitudes."

1554. τ² AQUARII.

	h. m. s.		s.
R. A.	**22 43 47**	Prec. +	3·19
	° ′		″
Decl.	**S 14 10·3**	—— N	18·95

	Position.	Distance.	Epoch.
	°	″	
HERSCHEL, W.	288·5	123·6	1783·6
SOUTH	292·4	133·4	1824·8

A beautiful orange star of mag. 5, with a distant companion. Schmidt calls it simply "red." The estimates of magnitude differ a good deal: Argelander and Heis make it 4; B. A. C., 5½.

1555. γ PISCIS AUSTRALIS. (*h. 5367.)

	h. m. s.		s.
R. A.	**22 46 25**	Prec. +	3·37
	° ′		″
Decl.	**S 33 27·5**	—— N	19·03

	Position.		Distance.		Epoch.
	°		″		
HERSCHEL, J.	276·8	...	3·6	...	1835·55
BURNHAM	271·6	...	3·5	...	1879·70

A double star. A 5; B 9. The estimates of the magnitude of A vary from 4½ to 5.

1556. 241 B CEPHEI. (Σ. 2950.)

	h. m. s.		s.
R. A.	**22 47 4**	Prec. +	2·30
	° ′		″
Decl.	**N 61 7·0**	—— N	19·05

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	319·1	...	2·04	...	1832·25

A double star. A 6, yellow; B 7½, ash. It may be stated that "ash" is Lord Crawford's rendering of Struve's "cinerea."

1557. δ PISCIS AUSTRALIS. (β. 772.)

	h. m. s.		s.
R. A.	**22 49 52**	Prec. +	3·37
	° ′		″
Decl.	**S 33 7·8**	—— N	19·15

	Position.		Distance.		Epoch.
	°		″		
BURNHAM	238·4	...	5 ±	...	1879·71

A double star. A 5½; B 12. B was discovered by Burnham at Mount Hamilton in California. He says that the companion is much more difficult than Sir J. Herschel's companions to the neighbouring star γ Piscis Australis.

1558. 16 LACERTÆ. (Σ. 2960.) DCCCXXV.

	h. m. s.		s.
R. A.	**22 51 22**	Prec. +	2·72
	° ′		″
Decl.	**N 41 1·0**	—— N	19·17

		Position.		Distance.		Epoch.
		°		″		
STONE, O.	A B	346·4	...	27·3	...	1879·43
	A C	46·7	...	63·5		

A delicate triple star, in the space between the Lizard's back and the left hand of Andromeda. A 6, bright white; B 15, pale blue; C 9½, reddish; a fourth star at a distance in the *np* quadrant. This object is one of singular difficulty, from the minuteness of the nearer component.

16 Lacertæ is claimed for Andromeda by some compilers, but is now usually regarded as the last in the Lizard. A line from α Pegasi led N. ½ W. between β and η Pegasi, and carried as far again, finds it to

the S.S.W. of a pair of stars, of 4th and 5th magnitudes, N. and S. of each other.

1559. *α* PISCIS AUSTRALIS. DCCCXXIV.

	h.	m.	s.			s.
R. A.	**22**	**51**	**34**	Prec.	+	3·32
		°	′			″
Decl.	**S**	**30**	**12·3**	——	N	19·17

	Position.		Difference of R. A.		Epoch.
	°		s.		
Smyth	195	...	4·8	...	1833·54

A *Nautical Almanac* star with a very distant companion near the vertical of the *sp* quadrant, in the mouth of the Southern Fish. A 1, reddish; B 9½, dusky blue. This is the well-known Fomalhaut, a nautical star, the lunar distances of which are computed and given in the Ephemeris: it derives its name from the Arabian *fom-al-ḥút*, the fish's mouth; more fully written *fom-al-ḥút al-jenúbí*, or Piscis Australis.

Fomalhaut is one of the best observed of the old Catalogue objects, there being only a difference of −2½′ in the distance between it and Regulus, as compared between Ptolemy and the moderns.

The colour of this star, and its apparent race after the Sun, made it a marked object, and the observer will find that the difference is not little between the slow march of Polaris over the meridian and the gallop of Fomalhaut. But it affords a favourable means of experimenting on the atmospheric property which H̨. calls the "prismatic power," and which he defines as "that refractive quality whereby the atmosphere disperses the rays of light, and gives a lengthened and coloured image of a lucid point." This power, which depends on the obliquity of the incident ray, diminishes with the increase of altitude, and therefore he recommends attention to the subject, since in delicate long polar-distant observations its effect ought not to be overlooked. But though I clearly saw the prismatic spectrum afforded by my lowest stars, I was unable to make any satisfactory experiments for correcting the measures thereby.

'Ιχθὺς νότιος, 'Ιχθὺς μέγας, Piscis notius, Piscis magnus, Piscis australis, Piscis austrinus, are names by which the Southern Fish was known to the classical ancients. It is a small asterism S. of the Water-bearer, and is represented with its head turned towards the E. and its tail to the W. In the early Venetian editions of Hyginus there is a smaller fish close under it, *remora* fashion, interfering with the *solitarius* by which that astronomer, from its insulated position, designated Piscis notius. In the celebrated MS. of Cicero's *Aratus*, before quoted, the figure is inscribed S̃. STELLAE XII., to which number

six *amorphotæ* were added by Ptolemy, since whose time the constituents have thus progressively increased:

Ptolemy . . .	18 stars.	Brisbane	36 stars.
Flamsteed . .	24 ,,	Bode	77 ,,

The Arabs have drawn a figure in this portion of the heavens, probably before they were acquainted with the Greek constellations: of this Fomalhaut was *Ḍifda' al-auwel*, the first frog; and β Ceti was *Ḍifda' al-thâni*, the second frog. It is easily found. A line carried from Aquila to the W.S.W. over the tail of Capricorn hits it; as does another from the N.E. by α and β Ceti. To the N., a line from Polaris, through the preceding components of the square of Pegasus, reaches it after passing over the group in the urn-stream of Aquarius. To those in the more southern latitudes, the rhymester thus advises:

He who would trace where dimly seen the austral Fish doth glide,
Must start from Scheat, and through Markab his occult line will guide:
When forty-five degrees thus pass'd, conduct him to the south,
The dazzling Fomalhaut he'll find, in Piscis notius' mouth.
When there, south-eastward cast the eye— how glorious! how fine!
Achernar with Canopus bright and Fom'lhaut form a line.

The Rev. Charles Turnor (*Newtonian Turnor*) lent me a very valuable MS. Almanac, of 1340, which, by a note on the fly-leaf, appears to have belonged to the library of the convent "De Babewell," near St. Edmund's Bury: it is in excellent preservation, and in the original wooden binding. To the astronomical antiquary it is replete with interest, containing Solar, Lunar, and Planetary Tables, *cum canonibus;* the geographical positions of the then most important parts of the world, and "Tabulæ Magistri Johannis de Lineriis de quinque Planetis retrogradis," &c., also *cum canonibus.* Among its contents is a list of thirty-five principal stars, with their Arabian designations, and their constellation places, brought up from Ptolemy's Catalogue by applying 45″ for the annual change of longitude, and allowing the latitudes to remain unaltered. In this precursor of the *Nautical Almanac* is our present star, Fomalhaut, distinguished as *Al-jenúbí*, southernmost, and as *Os piscis midiani*, which is clear of the obscurity that prevailed from Ptolemy's having inserted it in both Ὑδροχόος and Ἰχθὺς νότιος. Baily, in his new edition of Ptolemy, No. 670, thinks that an error of nearly 3° may have arisen in the latitude of Fomalhaut, from some of the glossators mistaking the numeral $\kappa\gamma^1$ for $\kappa\gamma$. An extract from Master de Lineriis shows that the supposition is well grounded.

As to Johannes de Lineriis, my friend De Morgan, who may be termed the *furet* of scientific biography, tells me, that little is known of him, except that he was of Amiens, and has left some Tables in manuscript. Delambre merely says that he "fit quelques observations qu'on trouve dans les Œuvres de Gassendi. Tome vi. p. 502."

1560. 2196 h. CASSIOPEIÆ. (H. 4874; 𝕽.)

		h.	m.	s.			s.
R. A.		**22**	**52**	**52**	Prec.	+	2·54
Decl.	**N**		**53°**	**45′·7**	——	N	19″·20

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; E;" which means:—"a cluster; very large; extended."

1561. β PEGASI. DCCCXXVI.

		h.	m.	s.			s.
R. A.		**22**	**58**	**25**	Prec.	+	2·88
Decl.	**N**		**27°**	**29′·0**	——	N	19″·34

	Position.	Distance.	Epoch.
BURNHAM	208°·5	98″·8	1879·53

A bright star with a distant minute companion, on the animal's left fore-leg. A 2, deep yellow; B 15, blue; there is a 10th magnitude star in the *sp*, and a 9th one follows A on the parallel. β is the Scheat of the Palermo and other Catalogues, probably a corruption of *sá'id*, an arm, or cubit; it is generally called *Menkib al-feres*, the horse's shoulder, by the Arabs.

Scheat precedes α in the head of Andromeda, a little S. of its W. parallel, by 16°; where the line of the Pointers carried over the Pole, and 62° beyond, reaches it. We hear that

> The brilliant Scheat, some three degrees, upon a south-west line,
> Points where the hero's lucky stars, call'd *my* and *lambda*, shine.

1562. α PEGASI. DCCCXXVII.

		h.	m.	s.			s.
R. A.		**22**	**59**	**16**	Prec.	+	2·98
Decl.	**N**		**14°**	**36′·8**	——	N	19″·36

	Position.	Difference of R. A.	Epoch.
SMYTH	305°	17s.	1833·78

A *Nautical Almanac* star, with a very distant telescopic companion, at the junction of the animal's wing and shoulder, 13° S. of β Pegasi. A 2, white; B 11, pale-grey; and the two point to a third star about as far again in the *np* quadrant.

α Pegasi is usually termed Markab, a thing ridden upon, a vehicle, a ship; here, perhaps, a saddle, as in Hebrew, from a version of the

Almagest, in which language the *Alphonsine Tables* were probably taken. Sir W. Herschel ranked it among the insulated stars.

Pegasus was simply called Ἵππος, the horse, by Aratus and the Greeks; Πήγασος, Equus alatus, sprang only from later poetic invention. Eratosthenes, it is true, mentions it, but see in what manner: "Some think," says he, "the horse is that Pegasus which, after the fall of Bellerophon, flew to the stars. But this cannot be, as it has no wings:" it therefore follows, that those appendages are a later addition. The Romans termed it Equus; but Germanicus uses the designation Pegasus, while Ovid calls it Equus Gorgoneus, in allusion to its fabled origin. Cornipes and Sonipes ales were poetical terms for Bellerophon's horse; but certain "*konnyng squiers*" talk of a Jewish legend which carries it to greater antiquity, as being Nimrod's horse. It merits the name Equi-sectio more than Equuleus, since only the fore part of a horse, with a pair of wings, is figured; and that in an inverted position, the head being further from the north pole than the body. It occupies a considerable space, and is at once recognised by a large equilateral square, formed by the four fine bright stars, α, β, γ Pegasi, and α Andromedæ,—or Markab, Scheat, Algenib, and Alpherat. It is a *paranatellon* to Aquarius and Pisces, and has been thus registered:

Ptolemy	20 stars.	Hevelius	38 stars.
Tycho Brahé . .	23 ,,	Flamsteed . . .	89 ,,
Bullialdus . . .	24 ,,	Bode	393 ,,

From its situation relatively to Cepheus and Cassiopeia, and being between Andromeda and Aquarius, Pegasus is of easy recognition. A line, or arc of a circle, from β and α Ursæ Majoris, crosses the pole and passes the leaders of the great square. To align the vicinity, observe the rhymester's rules:

A line athwart this spacious square to north-west shows the Swan,
Transverse to that a north-east ray, points Perseus upon;
And on that way two beauteous stars divide the space between,
In equal portions, from Mirak to where Al'mak is seen.

1563. 55 H. I. PEGASI. DCCCXXVIII.

(h. 2205; H. 4892; ℞.)

	h.	m.	s.		s.
R. A.	22	59	27	Prec. +	2·99
	°	′			″
Decl.	N 11	43·9		—— N	19·36

An elongated nebula in the animal's mane, and about 3° due S. of α. This is very faint; but after long gazing under clock-work motion, it comes up, trending very nearly N. and S., having a telescopic star at each extreme. It was described by H. as being 4′ long and 2′ broad. Not only is its aspect very different from the apparently spherical nucleated masses so often occurring, but it appeared a mere streak even in Sir J. Herschel's 20ft reflector, tapering at each end. Now, the sphere being the general figure assumed in consequence of the particles mutually attracting each other, we can only suppose that the lenticular appearance before us is a vast ring lying obliquely to our line of vision. Observation and analogy unite in showing that this object is at an inconceivable distance beyond the stars. Yet there remains an interesting and important inquiry: I allude to the apparent connection of one or two most minute stellar points with some of the smaller nebulæ, as exemplified in several of these celestial gossamers. Sir John has noted several very remarkable instances in his Catalogue of 1830.

[Engraved, *Phil. Trans.*, 1833, Pl. vi. Fig. 63; *Phil. Trans.*, 1850, Pl. xxxvi. Fig. 4; D'Arrest, *Dissertation*, 1861, Pl. ii. Fig. 6; D'Arrest, *Siderum Nebulosorum*, p. 362.]

1564. 9367 Lac. GRUIS.

	h.	m.	s.		s.
R. A.	23	0	55	Prec. +	3·53
		°	′		″
Decl.	S	51	16·8	—— N	19·39

	Position.		Distance.		Epoch.
	°		″		
Herschel, J.	260·5	...	8·1	...	1836·32

A double star. A 6½; B 7.

1565. 306 P. XXII. PEGASI. (Σ. 2978.) DCCCXXIX.

	h.	m.	s.		s.
R. A.	23	2	12	Prec. +	2·85
		°	′		″
Decl.	N	32	13·8	—— N	19·42

	Position.		Distance.		Epoch.
	°		″		
Herschel, J., and South	148·3	...	8·7	...	1823·75
Struve, W.	146·2	...	8·4	...	1830·6
Dunér	145·2	...	8·5	...	1868·55
Wilson	145·7	...	8·6	...	1873·78

A fine double star, in the space N. of the animal's chest, and in a blank vicinity 4½° N. ½ E. from β Pegasi. A 7, bright white; B 8½, sapphire blue. [As a double star this is undoubtedly fixed.]

1566. 57 PEGASI. (Σ. 2982.) DCCCXXX.

		h.	m.	s.			s.
R. A.		23	3	58	Prec.	+	3·02
		°	′				″
Decl.	N	8	4·8		——	N	19·44

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	198·2	32·5	1831·06
Burnham	199·2	32·4	1877·78

A very delicate double star, between the mane of Pegasus and the head of the preceding fish, about 6° S. ½ E. of *α* Pegasi; and it is the middle one of 3 of similar magnitudes, within a degree of each other. A 5½, orange; B 13, greenish; and these are followed nearly on the parallel by a third star. This object being too difficult for exact metrical observations, the angle of position was obtained by the spherical crystal micrometer, and the distance estimated. [Evidently fixed.]

1567. π CEPHEI. (O. Σ. 489.) DCCCXXXI.

		h.	m.	s.			s.
R. A.		23	4	23	Prec.	+	1·88
		°	′				″
Decl.	N	74	47·6		——	N	19·47

	Position.	Distance.	Epoch.
	°	″	
Smyth	330	2·0	1843·77
Struve, O.	351·4	1·15	1846·48
Dembowski	14·2	1·24	1865·88
Burnham	23·8	1·28	1878·66

A close double star with a distant minute companion [Pos. 241°; Dist. Δ R.A., 11·8ˢ; Epoch 1838·75], preceding the Æthiop's right leg, and the nearest star of note to the S.W. of *γ*, in the curve towards *β*. A 5, deep yellow; B 10, purple; C 12, blue; and A and C point nearly upon a distant small star in the *sp* quadrant.

π Cephei obtained a place on my working list, from having a *comes* marked closely to the N. of it on Sir J. Lubbock's map. On a scrutiny which I gave it in 1838 I found nothing nearer than C, but was not satisfied with the definition of A. Thus the matter would have rested, had not O. Struve, with the gigantic telescope at Poulkova, detected the little star B: thus apprised, it appeared, on steady gazing, sufficiently obvious at Hartwell in 1843 to admit of an estimation.

1568. 430 H. II. PISCIUM. DCCCXXXII.

(h. 2216; H. 4909; ℜ.)

	h.	m.	s.			s.
R. A.	23	9	8	Prec.	+	3·05
		°	′			″
Decl.	N	3	55·9	——	N	19·56

A faint nebula in the eye of the preceding or W. Fish, and about 10° S. ½ E. of α Pegasi; consequently within a degree to the N.N.W. of γ Piscium. This object is so dim as to be only perceptible under settled gazing and clock-work motion, when it faintly gleams among the telescopic stars in the field. It was by H. described as being 4′ long by 1′ in breadth. H. describes it as 80″ in length; and both those astronomers mention its being preceded by a still fainter nebula in the *sp* quadrant, of which my instrument gave no trace.

After gazing upon this pale nebula, I turned the telescope upon that vaporous mass, Encke's comet, on the diaphanous night of October 17th, [1838]. It was then in an irregular trapezium of Milky-way telescopic stars, in R. A. 2^h 5^m and Dec. + 48° 6′; but its glow was at least in the proportion of three to one over the nebula, faint as the wonderful and incoherent wanderer certainly was at that time,

["Exceedingly faint with $8\frac{1}{2}^{\text{in}}$ refractor. Not worth finding."—*Brodie.*]

1569. ψ^1 AQUARII. (Σ. 12 App. II.) DCCCXXXIII.

	h.	m.	s.			s.
R. A.	23	10	7	Prec.	+	3·12
		°	′			″
Decl.	S	9	41·3	——	N	19·58

		Position.		Distance.		Epoch.
		°		″		
SOUTH	A B	311·1	...	49·8	...	1824·80
MAIN	A B	313·4	...	51·6	...	1865·70
JEDRZEJEWICZ	A B	312·6	...	49·9	...	1877·84
BURNHAM	B C	34·9	...	18·4	...	1877·69
	A D	275·0	...	63·0		

A double star in the centre of the upper part of the stream which Aquarius pours out, being the first of three similar stars, ψ^1, ψ^2, and ψ^3, and rather more than one-third of the way from Fomalhaut to α Andromedæ. A 5½, orange tint; B 9, sky-blue. [Burnham's companions are very small.]

In the description of the Sphere, or Frame of the World, by Wyllyam Salysbury, in 1550, it is stated that "the iiii. starres that be at the ryght hande's ende of Aquarius are called Urna." This is, however, in the stream, where a principal star, κ, is called Situla, and by the

Arabs *Al Delw*, both meaning the water-bucket. But Gassendi and others have derived Situla from *sitis*, thirst, it having been looked upon as a star of dryness by those Sidrophels who viewed the Water-bearer's urn as an oven.

1570. 94 AQUARII. (Σ. 2998.) DCCCXXXIV.

	h. m. s.		s.
R. A.	23 13 18	Prec. +	3·14
	° ′		″
Decl.	S 14 3·4	—— N	19·65

	Position. °	Distance. ″	Epoch.
Herschel, W.	342·7	13·7	1792·16
Struve, W.	346·6	13·9	1821·92
Smyth	345·4	14·0	1838·91
Dembowski	344·8	13·7	1858·12
Goldney	345·2	13·8	1878·89

A neat double star in the space between the stream and the left knee of Aquarius, and one-third of the distance from Fomalhaut to α Andromedæ, in a N.N.E. direction. A 6, pale rose-tint; B 8½, light emerald. The observations above of H̥. are a mean between those taken in 1781 and 1802.

The above results imply fixity.

Sir W. Herschel, in 1781, familiarly described 94 Aquarii as being between ψ and ω towards δ. This is very correct, but it requires intimacy with the constellation to be available. As to Sir W. himself, he could unhesitatingly call every star, down to the 6th magnitude, by its name, letter, or number.

1571. ο CEPHEI. (Σ. 3001.) DCCCXXXV.

	h. m. s.		s.
R. A.	23 14 4	Prec. +	2·40
	° ′		″
Decl.	N 67 30·5	—— N	19·66

	Position. °	Distance. ″	Epoch.
Struve, W.	174·9	2·35	1832·84
Dembowski	187·2	2·73	1855·81
Gledhill	189·9	2·6	1874·91

An elegant double star in the space between the right arm and knee of Cepheus, and lying about 20° S.S.W. of Polaris, with γ Cephei midway between them. A 7, orange yellow; B 9, deep blue; the colours in fine contrast.

Little can be said upon the data until a longer lapse of time has intervened, when it may very probably prove to be a physical object. [Secchi says: "moto certo."]

1572. 9446 Lac. GRUIS.

		h.	m.	s.			s.
R. A.		23	14	10	Prec.	+	3·42
		°	′				″
Decl.	S	50	54·4		——	N	19·67

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	211·5	16·8	1836·93

A double star. A 7; B 9½.

1573. 69 P. XXIII. AQUARII. (Σ. 3008.) DCCCXXXVI.

		h.	m.	s.			s.
R. A.		23	18	4	Prec.	+	3·11
		°	′				″
Decl.	S	9	3·8		——	N	19·72

	Position.	Distance.	Epoch.
	°	″	
South	274·1	7·9	1824·80
Smyth	272·1	7·5	1834·79
Dembowski	264·7	5·9	1857·84
Cincinnati Obs.	255·9	4·9	1877·75
Stone, O.	253·8	4·8	1879·68

A very neat double star in the middle of the upper part of the urn-stream, and 20° on the N.N.E. line extending from *α* Piscis Australis towards *α* Andromedæ. A 8, and B 8½, both flushed; but the smaller one has the reddest tint.

[A decrease in both angle and distance is certain.]

1574. 3009 Σ. PISCIUM.

		h.	m.	s.			s.
R. A.		23	18	40	Prec.	+	3·06
		°	′				″
Decl.	N	3	6·7		——	N	19·73

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	229·4	6·8	1829·50

A double star. A 7½, very yellow; B 9½, blue. Follows *γ* Piscium at about 2°.

1575. 52 M. CEPHEI. (h. 2238; H. 4957; R.) DCCCXXXVII.

		h.	m.	s.			s.
R. A.		23	19	21	Prec.	+	2·63
		°	′				″
Decl.	N	60	59·5		——	N	19·74

An irregular cluster of stars between the head of Cepheus and his daughter's throne; it lies N.W. by W. of β Cassiopeiæ, and one-third of the way towards α Cephei. This object assumes somewhat of a triangular form, with an orange-tinted 8th magnitude star at its vertex, giving the resemblance of a bird with outspread wings. It is preceded by two stars of the 7th and 8th magnitudes, and followed by another of similar brightness; and the field is one of singular beauty under a moderate magnifying power. While these were under examination, one of those bodies called falling stars passed through the outliers. This phenomenon was so unexpected and sudden as to preclude attention to it; but it appeared to be followed by a train of glittering and very minute spangles.

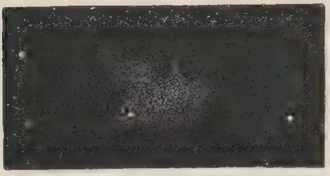

FIG. 49. 52 M. CEPHEI.

This cluster was discovered by Messier, "le Préposé du Ciel," in 1774, at Paris, and was then described as "a mass of very small stars blended with nebulous matter, and requiring a good telescope to distinguish them; it looks like a solid ball of stars, compressing into a blaze of light, with stragglers."

1576. 4 CASSIOPEIÆ. DCCCXXXVIII.

	h.	m.	s.			s.
R. A.	**23**	**19**	**57**	Prec.	+	2·62
	°	′				″
Decl.	**N 61**	**40·7**		——	N	19·75

		Position.	Distance.	Epoch.
		°	″	
BURNHAM	A B	226·2	98·1	1879·47
	A C	258·3	214·3	
	A D	35·3	10·3	

A coarse quadruple object, closely S. of Cepheus's right hand. A 5, pale yellow; B 9, yellowish; C 11, and D 13, both blue.

Noticing from the Palermo Catalogue that Piazzi had failed in finding the star 3 Cassiopeiæ, I carefully fished for it, under the hope that if it were only variable, I might catch it up; but *non inventa* was also my note. Since I was thus foiled, Baily's edition of Flamsteed has appeared, in which he observes, "There is no observation of this star in the 2nd volume of the *Historia Cœlestis*, the references given by Miss Herschel belonging to another and a different star, No. 3224 of this Catalogue. In MSS. Vol. 26 B, p. 36, the position is said to have been obtained *per distantias;* probably from the star which is called *supra* τ, in Vol. 2, p. 63. If so, I apprehend it must have been introduced through some mistake in the trigonometrical computation, as there is no star to be found corresponding with the position here given." It is plain, therefore, that

3 Cassiopeiæ must not be included among the lost or missing stars, since there is no proof of its ever having been duly enrolled.

1577. 18 Ħ. IV. ANDROMEDÆ. (h. 2241; H. 4964; ℜ.)

	h.	m.	s.			s.
R. A.	23	20	35	Prec.	+	2·86
	°	′				″
Decl. N	41	55·5		——	N	19·77

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"!!!; ○; vB; pS; R; blue;" which means:—"remarkable; a planetary nebula; very bright; pretty small; round; blue." Webb says:—"Small but very bright. Lassell sees nucleus and 2 oval rings. Earl of Rosse a spiral structure. Huggins, 8in achromatic, annular, greenish blue; a spectrum of 4 gaseous lines; the 4th *here only*." Engraved, *Phil. Trans.*, 1833, Pl. v. Fig. 45; Rosse, *Phil. Trans.*, 1850, Pl. xxxviii. Fig. 13; Rosse, *Phil. Trans.*, 1861, Pl. xxx. Fig. 40; Lamont, *Die Nebelflecken*, 1837, Pl. i. Fig. 3; Lassell, *Mem. R. A. S.*, vol. xxxiv. Pl. x. Fig. 38; Secchi, *Descrizione Osserv. Coll. Rom.*, Pl. iv. Fig. 4.

1578. 3995 h. TOUCANI. (H. 4970.)

	h.	m.	s.			s.
R. A.	23	22	46	Prec.	+	3·45
	°	′				″
Decl. S	60	19·2		——	N	19·79

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; S; l E; vsvmb M * 11;" which means:—"bright; small; not much extended; very suddenly very much brighter in the middle where there is a star of the 11th magnitude."

1579. 101 P. XXIII. CASSIOPEIÆ. DCCCXXXIX.
(O. Σ. 496.)

	h.	m.	s.			s.
R. A.	23	24	56	Prec.	+	2·72
	°	′				″
Decl. N	57	56·6		——	N	19·82

		Position.	Distance.	Epoch.
		°	″	
Burnham	AB	342·6	1·26	1880·64
	CD	225·3	1·36	
	AC	269·0	75·6	
	Aa	114·5	43·6	
	Ab	338·7	67·1	
	bc	74·3	11·0	
	Cd	336·8	27·3	

A multiple star between the head of Cepheus and the throne of his daughter, where a line from Polaris, led through γ Cephei, and carried double that distance southwards, strikes it. A 5, light yellow; C 7½, white; d 14, blue. Of this fine group I diagrammed six components.

To A and C I added the star which [I have designated d], and, in so doing, of course observed C very closely, but without noticing anything particular about it. On my requesting Dawes to examine this object ten years after my measures were taken, he distinctly made C to be closely double, the primary having a small companion at an angle of about 222°, and 1½″ distance. This was very remarkable; inasmuch as I cannot but think, had it been *out*, that either O. Σ., H., S., or myself must have seen it, especially as I made such careful estimations of [d] that I might almost have registered it, *observatio egregie certa;* and moreover, it is so much smaller than the companion to C, that, to say the least, the latter ought to have been seen.

[The above paragraph has been revised to harmonise as well as may be the various accounts. This object well deserves the attention of the possessors of large telescopes.]

1580. 3999 h. PHOENICIS. (H. 4985.)

		h. m. s.			s.
R. A.		**23 29 24**	Prec.	+	3·35
		° ′			″
Decl.	**S**	**56 37·1**	——	N	19·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"B; c S; E; g, sb M; ∗ 8·9 p;" which means:—"bright; considerably small; extended; at first gradually, then suddenly brighter in the middle; a star of mag. 8½ precedes the nebula."

1581. 62 ♅. VIII. CEPHEI. (h. 2255; H. 4990.)

		h. m. s.			s.
R. A.		**23 29 30**	Prec.	+	2·51
		° ′			″
Decl.	**N**	**72 18·5**	——	N	19·88

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:—"cl; L; P; l C; st 8, 10 . . . 15;" which means:—"a cluster; large; poor; not much compressed; it contains one 8th mag. star, and other stars ranging from the 10th to the 15th magnitudes."

1582. θ PHOENICIS.

	h. m. s.		s.
R. A.	23 33 34	Prec. +	3·26
Decl.	S 47° 14′·9	—— N	19″·92

		Position.		Distance.		Epoch.
Herschel, J.		268°·8	...	4″·5	...	1835·95

A double star. A 7; B 9.

1583. κ ANDROMEDÆ. DCCCXLI.

	h. m. s.		s.
R. A.	23 34 59	Prec. +	2·92
Decl.	N 43° 43′·6	—— N	19″·94

		Position.		Distance.		Epoch.
Burnham	A B	189°·1	...	47″·1	...	1879·46
	A C	294·6	...	103·1		
Stone, O.	A B	188·8	...	56·8	...	1879·57
	A C	293·8	...	100		

A wide but delicate triple star on the northern hand of the manacled lady; it lies midway between β Pegasi and α Cassiopeiæ, and about 18° from each. A 5, brilliant white; B [11], dusky; C [11], ash-coloured; and there is a fourth star nearly on the preceding parallel at a distance. The *comes* is so flitting and uncertain an object, that the estimations here given can only be ranked as comparative guesses. It forms, however, a severe test-object; but as those distant and minute companions probably do not belong to the primary, they constitute the best points with which to compare the deviations of the large star.

Here the improvement of vision by looking aslant at the *comites* is another proof that the axis of the eye, that is, the direction in which we habitually look, is not always that in which we see objects best.

1584. 171 P. XXIII. ANDROMEDÆ. (Σ. 3034.) DCCCXLIII.

	h. m. s.		s.
R. A.	23 39 5	Prec. +	2·93
Decl.	N 45° 46′·1	—— N	19″·97

		Position.		Distance.		Epoch.
Struve, W.	A B	103°·7	...	5″·3	...	1831·85
Burnham	A B	98·7	...	5·5	...	1879·46
	A C	129·9	...	381		

A very delicate double star, N. of Andromeda's left hand, and in the Galaxy, about 12° S.S.W. of α Cassiopeiæ, where there is a little group, of which the principal is ψ. A 7½, topaz yellow; B 13, blue; C 10, plum-colour; and the three point to a triplet of small stars in the *sf* quadrant. A and B were first classed as double by Struve.

1585. ψ ANDROMEDÆ.

	h.	m.	s.			s.
R. A.	**23**	**39**	**54**	Prec.	+	2·94
	°	′				″
Decl.	**N 45**	**48·5**		——	N	19·98

A pair of stars. A and B both 5, and white. Mentioned by Webb as similar in class to 56 Andromedæ and 203 P. I. Andromedæ.

1586. 107 AQUARII. DCCCXLIV.

	h.	m.	s.			s.
R. A.	**23**	**40**	**18**	Prec.	+	3·12
	°	′				″
Decl.	**S 19**	**17·5**		——	N	19·98

	Position. °	Distance. ″	Epoch.
Herschel, J., and South	143·5	5·0	1823·79
Smyth	141·8	5·5	1832·80
Stone, O.	138·2	5·8	1877·7

A very neat double star, in the group near the centre of the urn-stream, 16° N.E. of α Piscis Australis, and 15° due W. of β Ceti. A 6, bright white; B 7½, blue. There is some countenance to a retrograde motion and increasing distance.

1587. 179 P. XXIII. PISCIUM. (Σ. 3036.) DCCCXLV.

	h.	m.	s.			s.
R. A.	**23**	**40**	**22**	Prec.	+	3·07
	°	′				″
Decl.	**S 0**	**20·8**		——	N	19·98

	Position. °	Distance. ″	Epoch.
Struve, W.	228·2	2·41	1832·50
Stone, O.	227·5	2·56	1877·82

A most delicate double star under the preceding Fish, and about midway between α Piscis Australis and α Cassiopeiæ. A 8½, pale white; B [12], blue; and there is a star of the 10th magnitude in the *nf* quadrant, not far from the vertical, which identifies the object. This is a difficult test, and requires long attention to discern it clearly.

1588. 4005 h. SCULPTORIS. (H. 5012.)

	h.	m.	s.			s.
		°	′			″
R. A.	23	42	10	Prec.	+	3·13
Decl.	S	31	7·8	——	N	20·00

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:— "B; c L; R; psmb M;" which means:—"bright; considerably large; round; pretty suddenly much brighter in the middle."

1589. 4006 h. PHOENICIS. (H. 5017.)

	h.	m.	s.			s.
		°	′			″
R. A.	23	45	8	Prec.	+	3·15
Decl.	S	41	21·0	——	N	20·01

A nebula thus described in Sir J. Herschel's *Catalogue* of 1864:— "B; p L; R; gb M;" which means:—"bright; pretty large; round; gradually brighter in the middle."

1590. 2276 h. PEGASI. (H. 5023; R.)

	h.	m.	s.			s.
		°	′			″
R. A.	23	46	9	Prec.	+	3·05
Decl.	N	15	38·6	——	N	20·02

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:— "Cl of sc st 10m;" which means:—"a cluster of scattered stars chiefly of the 10th magnitude."

1591. 28 B. ANDROMEDÆ. (Σ. 3042.)

	h.	m.	s.			s.
		°	′			″
R. A.	23	46	21	Prec.	+	3·00
Decl.	N	37	17·0	——	N	20·02

	Position.		Distance.		Epoch.
	°		″		
STRUVE, W.	89·3	...	4·2	...	1832·25
MAIN	85·1	...	4·6	...	1863·75

A double star. A and B both 7½, and very white.

1592. 216 P. XXIII. PEGASI. (Σ. 3044.) DCCCXLVI.

R. A. 23h 47m 21s | Prec. + 3s·05
Decl. N 11° 18′·8 | —— N 20″·03

	Position.		Distance.		Epoch.
	°		s.		
HERSCHEL, J.	102·5	...	18·0	...	1831·80
SMYTH	102·0	...	18·5	...	1834·81
DUNÉR	101·7	...	18·7	...	1868·85

A neat double star on the animal's wing, lying about 6° to the S.W. of γ Pegasi. A and B both 8½, and both silvery white.

1593. 30 ♅. VI. CASSIOPEIÆ. DCCCXLVII.
(h. 2284; H. 5031; ℞.)

R. A. 23h 51m 35s | Prec. + 2s·97
Decl. N 56° 6′·2 | —— N 20″·04

	Position.		Distance.		Epoch.
	°		″		
SMYTH	220	...	5	...	1835·68

A fine Galaxy cluster of minute stars, on a ground of star-dust, on the upper part of Cassiopeia's chair or throne: it is 3° S.S.W. of β, and not much further to the W. of α, where it lies in mid-distance between ρ and σ, stars of the 5½ and 6th magnitudes, each of which has a companion of the like brilliance. It is, indeed, a very glorious assemblage, both in extent and richness, having spangly rays of stars which give it a remote resemblance to a crab, the claws reaching the confines of the space in view, under an eye-piece magnifying 185 times. With this form in the mind's eye, the imagined head will be in the *np*, the tail in the *sf*, and where the eyes would be, is the minute close double star of the

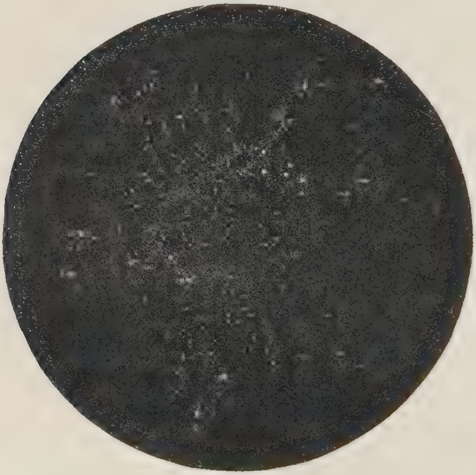

FIG. 50. 30 ♅ VI. CASSIOPEIÆ.

11th and 12th magnitudes, above estimated. There are several other pairs in the figure, especially towards the tail. The crab itself is but a mere condensed patch in a vast region of inexpressible splendour, spreading over many fields.

This beautiful object was first seen by the indefatigable Miss Herschel, whose labours are so intimately connected with those of her illustrious brother; and who, enrolling it in the autumn of 1783, realized the poet's description:

Some sequestered star
That rolls in its Creator's beams afar,
Unseen by man; till telescopic eye,
Sounding the blue abysses of the sky,
Draws forth its hidden beauty into light,
And adds a jewel to the crown of night.

In November, 1843, this lady was still living, at Hanover, nearly 94 years of age, and in the enjoyment of her mental faculties, after such persevering labour in the pursuit of science. And astronomy is very largely in her debt: for, besides her continuous task as the Slough amanuensis, she was assiduous as an observer; and with her little Newtonian Sweeper, of only 27in focal length, and field of 2° 12′, under a power of 20, she discovered various clusters and nebulæ, and no fewer than 5 comets, of which that of 1795 is the wonderful short-period one designated Encke's. This interesting instrument, of which the annexed is a sketch from memory, still exists. Owing to the admiration with which I have always viewed Miss Herschel's career, it was most gratifying to be one of the components of a council of the Royal Astronomical Society which paid her a well-earned tribute of respect in 1835. It cannot be better told than in the words of the Report to the Fifteenth General Meeting of the Society. After noticing the narrow grounds and false principles which would interfere with the decision, it proceeds:

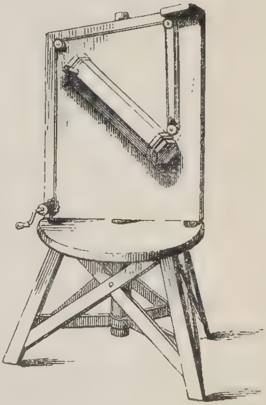

Fig. 51.

> "But your Council has no fear that such a difference could now take place between any men whose opinion would avail to guide that of society at large; and, abandoning compliment on the one hand, and false delicacy on the other, submits, that while the tests of astronomical merit should in no case be applied to the works of a woman less severely than to those of a man, the sex of the former should no longer be an obstacle to her receiving any acknowledgment which might be held due to the latter. And your Council therefore recommends this Meeting to add to the list of honorary members the names of Miss Caroline Herschel and Mrs. Somerville, of whose

astronomical knowledge, and of the utility of the ends to which it has been applied, it is not necessary to recount the proofs."

In gazing upon these myriads of universes, we cannot but be reminded of Gaspar Schott, the friend of Kircher and the precursor of Piazzi at Palermo;—who, writing so far back as 1667, congratulates man on being able to contemplate the multitude of heavenly bodies which the munificence of GOD has vouchsafed to manifest to us. But he predicts that many new stars, and even planets, will show themselves to those that search; for he thinks it "decidedly the part of intolerable arrogance to believe that our sight, lately strengthened by the invention of the telescope, though with the powers of a lynx, has surveyed all the stars; and it is the part of folly to wish to bind them by certain numbers and names: *stultitiæ, certis numeris et nominibus constringere velle.*" There are brilliant proofs that Schott did not overshoot the mark in his prediction.

1594. 240 P. XXIII. ANDROMEDÆ. DCCCXLVIII.

(Σ. 3048.)

R. A.	h. 23 m. 52 s. 28	Prec.	+	s. 3·04
Decl.	N 23° 44′·3	——	N	″ 20·05

	Position.	Distance.	Epoch.
	°	″	
SOUTH	315·4	9·3	1825·70
SMYTH	313·9	9·4	1833·88
MAIN	316·7	9·1	1861·79

A fine double star, which, though designated in Andromeda, is on the body of Pegasus, and *hooked* into the precincts of Pisces; being only 5° S.S.W. of *α* Andromedæ. A 8½, pale white; B 9, yellowish; and two of the same magnitude follow, as remarked by Piazzi, one to the N. and one to the S.

This must, in our present state of knowledge, be deemed an optical pair, casually juxtaposed in the heavens.

[Knott in 1862 found B to be "most decidedly" blue.]

1595. R CASSIOPEIÆ.

R. A.	h. 23 m. 52 s. 49	Prec.	+	s. 3·01
Decl.	N 50° 46′·4	——	N	″ 20·05

A red and variable star with a blue companion at a distance of 20″.

The range of magnitude is from 5 to below 12, and the period 426d. Pogson says, "vividly red;" Auwers, "hellroth;" Schönfeld, "ausgezeichnet roth;" Argelander, "sehr roth;" Copeland, 1875, "magnificent deep orange."

1596. 2287 h. CASSIOPEIÆ. (H. 5034.)

R. A.	23h.	53m.	4s.	Prec.	+	3·00s.
Decl.	N	59°	24′·3	——	N	20″·04

A cluster thus described in Sir J. Herschel's *Catalogue* of 1864:—"Cl; v L; P; l C; st 7, 10;" which means:—"a cluster; very large; poor; not much compressed; it comprises a 7th mag. star, but the bulk of the stars are of the 10th magnitude."

1597. σ CASSIOPEIÆ. (Σ. 3049.) DCCCXLIX.

R. A.	23h.	53m.	25s.	Prec.	+	2·99s.
Decl.	N	55°	8′·5	——	N	20″·05

	Position. °	Distance. ″	Epoch.
HERSCHEL, J., and SOUTH	327·3	2·9	1823·08
SMYTH	323·7	3·0	1838·96
SMYTH	326·4	2·9	1848·71
DUNÉR	325·6	2·9	1870·27

A beautiful double star on the lady's left elbow, and one degree S. of the cluster H. 5031, which lies, as already mentioned, between σ and ρ. A 6, flushed white; B 8, smalt blue; the colours are clear and distinct, though less fine than those of ϵ Boötis, of which this is a miniature. It was by H. described as being at the vertex of a telescopic isosceles triangle turned to the S.

Sir W. Herschel was led to infer that a very considerable orbital change had occurred; but the data here given are against such a surmise. Some angles of position taken in 1834 appeared to be almost perfection: they were taken with a central paper disc, 2 inches in diameter, applied to the object-glass, which contrivance, though causing a slight diminution of light, in this instance improved the images by giving them sharper points.

1598. 37 B. ANDROMEDÆ. (Σ. 3050.)

R. A.	**23** h. **53** m. **53** s.	Prec.	+	3·04 s.
Decl.	**N 33° 7′·0**	——	N	20″·03

	Position.	Distance.	Epoch.
	°	″	
Herschel, J.	188·4	5·2	1821·92
Struve, W.	191·0	3·8	1832·65
Dawes	193·0	3·6	1843·81
Dembowski	196·5	3·6	1854·68
Secchi	200·2	3·6	1866·97
Wilson and Seabroke	203·6	3·1	1876·06
Jedrzejewicz	204·9	3·0	1880·10

A double star. A 6, yellowish; B 6, yellowish. "Probable change in angle and distance."—*Gledhill.*

1599. 3053 Σ. CASSIOPEIÆ.

R. A.	**23** h. **56** m. **57** s.	Prec.	+	2·99 s.
Decl.	**N 65° 29′·0**	——	N	20″·05

	Position.	Distance.	Epoch.
	°	″	
Struve, W.	69·9	15·1	1832·49
Main	69·9	15·0	1863·76

A double star. A 6, very yellow; B 8, blue.

1600. 9 CASSIOPEIÆ. DCCCL.

R. A.	**23** h. **58** m. **33** s.	Prec.	+	3·03 s.
Decl.	**N 61° 40′·5**	——	N	20″·06

		Position.	Distance.	Epoch.
		°	″	
South	AD	195·6	245·4	1824·84
Smyth	AB	330	80	1834·81
	AC	240	150	
	AD	194	244	

A wide quadruple group closely following the right hand of Cepheus, and 3° N. $\frac{1}{2}$ W. of β Cassiopeiæ. A 6, white; B 11, and C 12, both dusky; D 8, deep yellow.

A and D were micrometrically measured by Sir J. South at Passy; but without his perceiving either B or C.

1601. 8364 B. A. C. CASSIOPEIÆ. (Σ. 3057.)

R. A.	23h. 59m. 13s.	Prec. + 3s·06
Decl.	N 57° 55′·1	—— N 20″·06

	Position.	Distance.	Epoch.
Knott	298°·5	3″·5	1863·52

A double star. A 7, white; B 10, blue. These form "with Σ. 3062 a neat double star *sp* β Cassiopeiæ; between the pairs, at about middle distance, lie 3 small stars of 9, 9½, and 11½ mag."—(*Knott.*)

SUPPLEMENT.

1602. — CASSIOPEIÆ.

R. A.	0h. 18m. 41s.	Prec. + 3s·24
Decl.	N 63° 32′·3	—— N 19″·99

The above places indicate the position of Tycho's temporary star of 1572 as determined by Hind. And a star assumed to be Tycho's and believed to vary has been seen there. It may be readily identified by means of one of the 9th mag. (=22 Argelander Zone 60) near it. It follows this 9th mag. $29{\cdot}6^{\mathrm{s}}$ and is 10′ 4″ to S. of it, according to observations at Twickenham in Aug. 1872.

1603. — CEPHEI.

R. A.	0h. 52m. 33s.	Prec. + 5s ±
Decl.	N 81° 17′·0	—— N 19″·53

A remarkable variable star discovered to be such by M. Ceraski of Moscow in 1880. The period is only $2\frac{1}{2}^{\mathrm{d}}$ and the range from mag. 7 to mag. 9. The variation amounts to more than a whole magnitude in the course of one hour. Knott notes the colour at maximum to be bluish white, and at minimum, ruddy. The same observer has seen 2 companions to this object, whereof the first is in Pos. 60°; Dist. 10″; Mag. 11½; and the 2nd in Pos. 330° and Distance "slightly greater;" Mag. 13.

1604. 2391 Σ. ANTINOÏ.

R.A.	18h 42m 46s	Prec.	+ 3s.21
Decl.	S 6° 7′.4	——	N 3″.73

	Position.	Distance.	Epoch.
	°	″	
STRUVE, W.	332·5	37·9	1829·69
JEDRZEJEWICZ	332·9	37·9	1876·91

A double star. A 6, yellowish white; B 9.

L'Envoy.

THUS, "gentle reader," have I conducted you through the Cycle of XXIV. Hours, by a course which, however new, is very practicable; and I hope that its interest is sufficiently seductive to wind you up, like a clock, to run the same round again. To me the task has been onerous, laborious, and expensive; it has occupied the vigils of two or three Olympiads in making many thousand observations, and has given daily employment for a similar period in the reductions and discussions. Still the subject is so fascinating as to retain its influence, and, *Deo volente*, I may yet return to it. Such study constitutes a sort of scrutiny into futurity, and truly elevates the mind above the mundane system. We cannot see, without peculiar emotion, that the great law of gravitation, so recently acknowledged and demonstrated in our own system, is decidedly extended throughout the vast heavens; and it is palpable, that all the perceptible universe is amenable to the operation of time and space, motion and force, in similar relations with our own, and equally open to mathematical disquisition. Thus the whole firmament, with its countless and glorious orbs,—which, though sustaining apparently independent positions, are but individual constituents of one Majesty of Creation,—in the absence of a larger comprehension, countenances the sagacity of the oft-cited ancient dogma, that

"GOD WORKS BY GEOMETRY."

ANALYTICAL INDEX.

ANDROMEDA.

Synonyme.	Order.	Page
α Andr.	Star and *comes*	1
147 Ħ. III. Andr.	Dble. in cluster	4
22 Andr.	Star and double	4
4 Birm. Andr.	Red star	7
π Andr.	Double star	12
δ Andr.	Star and *comes*	13
18 Ħ. V. Andr.	Nebula	15
31 M. Andr.	"Great nebula"	15
175 P. O. Andr.	Double star	19
36 Andr.	Close dble. star	22
μ Andr.	Double star	23
164 B. Andr.	Double star	24
β Andr.	Star and *comes*	27
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241 B. Andr.	Double star	46
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— Antliæ	Double star	308

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100 B. Aquarii	Double star	641
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209 P. XXII. Aq.	Double star	655
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2017 h. Aquil.	Cluster	536
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94 M. Can. Ven.	Nebula	361
α Can. Ven.	Double star	365
96 ♅. I. Can. Ven.	Nebula	372
97 ♅. I. Can. Ven.	Nebula	373
63 M. Can. Ven.	Nebula	374
51 M. Can. Ven.	Nebula	383
25 Can. Ven.	Binary star	387
3341 * H. Can. Ven.	Double star	387
3 M. Can. Ven.	Nebula	389
187 ♅. I. Can. Ven.	Nebula	396

CANIS MAJOR.

β Can. Maj.	Star & *comes*	174
3858 *h. Can. Maj.	Double star	176
616(?) Dun. Can. Maj.	Nebula	179
2337 Lac. Can. Maj.	Double star	180
ν^1 Can. Maj.	Double star	181
12936 Lal. Can. Maj.	Double star	184
α Can. Maj.	Star & *comes*	185
41 M. Can. Maj.	Clust. and dble.	189
578 Dun. Can. Maj.	Globular clust.	190
17 [π^2] Can. Maj.	Quad. star.	193
μ Can. Maj.	Double star	193
ε Can. Maj.	Double & *comes*	193
14 ♅. VII. Can. Maj.	Cluster	194
δ Can. Maj.	Star & *comes*	197
3938 *h. Can. Maj.	Double star	197
12 ♅. VII. Can. Maj.	Cluster	199
30 Can. Maj.	Star & *comites*	201
η Can. Maj.	Star & *comes*	202

CANIS MINOR.

Synonyme.	Order.	Page
β Can. Min.	Triple star	203
44 ♅. VIII. Can. Min.	Cluster	204
S Can. Min.	Red variable s.	206
α Can. Min.	S. & *comes*	212
170 P. VII. Can. Min.	Double star	214
14 Can. Min.	Triple star	222

CAPRICORNUS.

396 P. XIX. Capr.	Double star	587
545 Birm. Capr.	Red star	592
α^2 Capr.	Multiple star	592
σ Capr.	Wide dble. star	595
β^2 Capr.	Star & *comites*	597
π Capr.	Double star	601
ρ Capr.	Double star	601
o^2 Capr.	Double star	602
312 P. XX. Capr.	Double star	613
72 M. Capri.	Cluster	614
73 M. Capr.	Cluster	616
30 M. Capr.	Cluster	635

CASSIOPEIA.

39 ♅. I. Cass.	Binary star	1
β Cass.	Star & *comes*	3
1 Birm. Cass.	Red star	3
22 h. Cass.	Cluster	8
79 ♅. VIII. Cass.	Cluster	8
λ Cass.	Double star	10
28 h. Cass.	Cluster	11
α Cass.	Star & *comes*	13
78 ♅. VIII. Cass.	Cluster	18
181 P. O. Cass.	Double star	19
η Cass.	Binary star	20
159 ♅. I. Cass.	Nebula	21
γ Cass.	Star & *comes*	22
μ Cass.	Triple star	26
64 ♅. VIII. Cass.	Cluster	27
42 ♅. VII. Cass.	Cluster	30
35 Cass.	Double star	31
ψ Cass.	Triple star	32
48 ♅. VII. Cass.	Cluster	36
131 Σ. Cass.	Double star	37
103 M. Cass.	Cluster	37
40 Cass.	Double star	39
46 ♅. VII. Cass.	Cluster	42
146 h. Cass.	Cluster	42
31 ♅. VI. Cass.	Clust. and dble.	43
163 Σ. Cass.	Double star	44
191 Σ. Cass.	Double star	50
55 Cass.	Star & *comites*	57
72 P. II. Cass.	Triple star	63
66 ♅. VIII. Cass.	Cluster	68
2196 h. Cass.	Cluster	661
4 Cass.	Quad. group	668
101 P. XXIII. Cass.	Multiple s.	669
30 ♅. VI. Cass.	Cluster	674
R Cass.	Red & vari. s.	676
2287 h. Cass.	Cluster	677

CASSIOPEIA—*continued.*

Synonyme.	Order.	Page
σ Cass.	Double star	677
3053 Σ. Cass.	Double star	678
9 Cass.	Quad. group	678
8364 B.A.C. Cass.	Double star	679
— Cass.	Tycho's temp. s.	679

CENTAURUS.

Synonyme.	Order.	Page
323 Dunlop Cent.	Cluster	289
248 P. X. Cent.	Double star	290
481 Dunlop Cent.	Cluster	301
81 P. XI. Cent.	Double star	303
289 Dunlop Cent.	Nebula	306
3365 h. Cent.	Planetary neb.	311
349 Dunlop Cent.	Cluster	314
3918 Brisb. Cent.	Double star	318
15 P. XII. Cent.	Double star	323
γ Cent.	Double star	348
510 (?) Dunl. Cent.	Nebula	359
5317 Lac. Cent.	Double star	363
5360 Lac. Cent.	Double star	368
411 Dunlop Cent.	Nebula	370
3468 h. Cent.	Nebula	371
3483 h. Cent.	Nebula	375
482 Dunlop Cent.	Nebula	375
ω Cent.	Globular cl.	380
312 (?) Dunl. Cent.	Cluster	381
252 (?) Dunl. Cent.	Nebula	384
5598 Lac. Cent.	Double star	385
83 M. Cent.	Spiral nebula	385
638 ♅. II. Cent.	Nebula	388
3529 h. Cent.	Nebula	389
273 Dunlop Cent.	Cluster	391
388 Dunlop Cent.	Cluster	391
3537 h. Cent.	Cluster	392
5700 Lac. Cent.	Double star	394
k Cent.	Double star	394
282 Dunlop Cent.	Cluster	395
h. Cent.	Double star	395
3548 h. Cent.	Nebula	396
4649 *h. Cent.	Double star	398
431 Dunlop Cent.	Cluster	400
3563 h. Cent.	Nebula	404
5893 Lac. (y) Cent.	Triple star	405
357 Dunlop Cent.	Cluster	407
302 Dunlop Cent.	Cluster	407
469 Dunlop Cent.	Nebula	409
α Cent.	Double star	410
333 Dunlop Cent.	Cluster	411

CEPHEUS.

Synonyme.	Order.	Page
316 B. Cephei	Double star	3
318 B. Cephei	Double star	6
191 P. II. Cephei	Dble. s. & 2 *com.*	76
κ Cephei	Double star	595
42 ♅. VI. Cephei	Cluster	605
η Cephei	Star & *comes*	612
192 ♅. I. Cephei	Nebula	618
83 B. Cephei	Double star	620
51 P. XXI. Cephei	Double star	625

CEPHEUS—*continued.*

Synonyme.	Order.	Page
α Cephei	Star & *comes*	627
2790 Σ. Cephei	Double star	628
β Cephei	Double star	632
248 P. XXI. Cephei	Triple star	636
256 P. XXI. Cephei	Double star	637
258 P. XXI. [μ] Ceph.	"Garnet star"	639
75 ♅. IV. Cephei	Nebula	639
66 ♅. VII. Cephei	Cluster	640
147 B. Cephei	Double star	640
2141 h. Cephei	Cluster	641
ξ Cephei	Double star	644
180 B. Cephei	Double star	644
11 P. XXII. Cephei	Double star	645
189 B. Cephei	Double star	645
2893 Σ. Cephei	Double star	647
2159 h. Cephei	Cluster	648
2161 h. Cephei	Cluster	650
δ Cephei	Dble. & var. star	652
2177 h. Cephei	Cluster	654
77 ♅. VIII. Cephei	Cluster	657
241 B. Cephei	Double star	658
π Cephei	Double star	664
ο Cephei	Double star	666
52 M. Cephei	Cluster	667
62 ♅. Cephei	Nebula	670
— Cephei	Ceraski's var. st.	679

CETUS.

Synonyme.	Order.	Page
ι Ceti	Double star	7
12 Ceti	Double & *comes*	9
113 P. O. Ceti	Double star	12
146 P. O. Ceti	Pair of stars	15
β Ceti	Star & *comes*	18
1 ♅. V. Ceti	Nebula	20
26 Ceti	Double star	24
η Ceti	Star & *comes*	27
37 Ceti	Quadruple	30
42 Ceti	Double star	31
100 ♅. I. Ceti	Nebula	36
251 Ceti	Double star	41
χ Ceti	Star & *comes*	44
ζ Ceti	Star & *comes*	45
191 P. I. Ceti	Double star	45
105 ♅. I. Ceti	Nebula	48
101 ♅. I. Ceti	Nebula	51
61 Ceti	Pair dble. stars	55
66 Ceti	Double star	59
ο Ceti	"Mira"	61
153 ♅. I. Ceti	Nebula	63
23 ♅. IV. Ceti	Planetary neb.	64
ν Ceti	Double star	66
102 ♅. I. Ceti	Nebula	67
84 Ceti	Double star	69
63 ♅. I. Ceti	Nebula	70
77 M. Ceti	Nebula	70
γ Ceti	Double star	71
64 ♅. I. Ceti	Nebula	72
α Ceti	Star & *comes*	77
94 Ceti	Double star	80

CHAMÆLEONTIS.

Synonyme.	Order.	Page
3241 h. Chamæl.	Planetary neb.	268

CIRCINUS.

α Circini	Double star	410
5071 Brisb. Circini	Double star	416
4746 *h. Circini	Multiple star	425
γ Circini	Double star	431
3610 h. Circini	Planetary neb.	440

CLYPEUS SOBIESKII.

2002 h. Clyp. Sob.	Cl. with dble. st.	523
24 M. Clyp. Sob.	Field of stars	524
16 M. Clyp. Sob.	Cluster	524
18 M. Clyp. Sob.	Dble. s. in clus.	525
15 B Clyp. Sob.	Double star	525
17 M. Clyp. Sob.	"Horse-shoe n."	525
29 B. Clyp. Sob.	Double star	531
26 M. Clyp. Sob.	Cluster	538

COLUMBA.

1780 Lac. Col.	Double star	132
3760 *h. Col.	Triple star	140
594 Dunlop Col.	Globular cl.	162

COMA BERENICIS.

174 ℍ. I. Com. B.	Nebula	316
2 Com. B.	Double star	316
19 ℍ. I. Com. B.	Globular cl.	321
73 ℍ. I. Com. B.	Nebula	322
11 ℍ. I. Com. B.	Nebula	322
1615 Σ. Com. B.	Double star	324
171 ℍ. I. Com. B.	Nebula	324
74 ℍ. I. Com. B.	Nebula	327
89 ℍ. I. Com. B.	Nebula	329
75 ℍ. I. Com. B.	Nebula	330
90 ℍ. I. Com. B.	Nebula	330
76 ℍ. I. Com. B.	Nebula	331
12 Com. B.	Star & *comes*	332
65 ℍ. I. Com. B.	Nebula	334
12 ℍ. I. Com. B.	Nebula	335
85 M. Com. B.	Nebula	336
77 ℍ. I. Com. B.	Nebula	337
91 ℍ. I. Com. B.	Nebula	337
17 Com. B.	Pair of stars	338
83 ℍ. I. Com. B.	Nebula	340
24 Com. B.	Double star	343
92 ℍ. I. Com. B.	Nebula	344
24 ℍ. V. Com. B.	Nebula	345
42 ℍ. V. Com. B.	Nebula	356
176 ℍ. I. Com. B.	Nebula	358
84 ℍ. I. Com. B.	Nebula	360
202 P. XII. Com. B.	Double star	361
35 Com. B.	Triple star	363
64 M. Com. B.	Nebula	366
42 Com. B.	Binary star	371
53 M. Com. B.	Cluster	372
63 P. XIII. Com. B.	Double star	375

CORONA AUSTRALIS.

Synonyme.	Order.	Page
κ Coronæ Austr.	Double star	531
γ Coronæ Austr.	Double star	555

CORONA BOREALIS.

1 B. Cor. Bor.	Double star	430
η Cor. Bor.	Binary star	432
17 B. Cor. Bor.	Double star	435
α Cor. Bor.	Star & *comes*	437
1964 Σ. Cor. Bor.	Triple star	438
ζ Cor. Bor.	Double star	439
γ Cor. Bor.	Binary star	440
T Cor. Bor.	Temporary s.	445
2022 Σ. Cor. Bor.	Double star	450
σ Cor. Bor.	Binary & triple	453
υ Cor. Bor.	Quadruple	453
2049 Σ. Cor. Bor.	Double star	461

CORVUS.

δ Corvi	Double star	339
β Corvi	Star & *comites*	342
58 B. Corvi	Double star	348
61 ℍ. I. Corvi	Nebula	367

CRATER.

α Crateris	Star & *comites*	283
R. Crateris	Red & var. s.	284
241 ℍ. I. Crateris	Nebula	296
39 P. XI. Crateris	Double star	297
γ Crateris	Double star	300
131 ℍ. I. Crateris	Nebula	300
17 Crateris	Double star	304
120 ℍ. I. Crateris	Nebula	309
259 ℍ. I. Crateris	Nebula	311
β Crateris	Double star	312
67 ℍ. I. Crateris	Nebula	314

CRUX AUSTRALIS.

291 Dunl. Crucis	Cluster	319
292 Dunl. Crucis	Cluster	334
α Crucis	Multiple star	336
γ Crucis	Star & *comes*	339
β Crucis	S. with red com.	359
κ Crucis	Fine cluster	362
311 Dunl. Crucis	Cluster	367

CYGNUS.

6 B. Cygni	Double star	559
149 P. XIX. Cygni	Double star	564
β Cygni	Double star	566
169 P. XIX. Cygni	Double star	567
55 M. Cygni	Globular cl.	569
R Cygni	Red & var. stars	570
2048 h. Cygni	Cluster	571
16 Cygni	Double star	572
δ Cygni	Double star	573
276 P. XIX. Cygni	Double star	574

CYGNUS—*continued.*

Synonyme.	Order.	Page
278 P. XIX. Cygni ...	Double star ...	575
73 Ħ. IV. Cygni ...	Nebula	575
χ Cygni	Double star ...	576
χ^2 Cygni	Variable star ...	578
ψ Cygni	Double star ...	584
116 B. Cygni ...	Triple star ...	584
59 Ħ. VII. Cygni ...	Cluster	587
20 Ħ. VIII. Cygni ...	Cluster	591
o^2 Cygni	Quad. group ...	592
172 B. Cygni	Double star ...	596
2671 Σ. Cygni ...	Double star ...	598
56 Ħ. VIII. Cygni ...	Cluster	600
29 M. Cygni	Cluster	600
199 P. XX. Cygni ...	Star & *comes* ...	604
ω^3 Cygni	Wide dble. star	604
8 Ħ. VII. Cygni ...	Cluster	606
2705 Σ. Cygni ...	Double star ...	606
2708 Σ. Cygni ...	Double star ...	607
49 Cygni	Double star ...	609
α Cygni	Star & *comes* ...	609
52 Cygni	Double star ...	611
15 Ħ. V. Cygni ...	Nebula	611
λ Cygni	Double star ...	613
76 Ħ. VIII. Cygni ...	Cluster	615
14 Ħ. V. Cygni ...	Nebula	615
429 P. XX. Cygni ...	Double star ...	616
59 Cygni	Triple star ...	617
452 P. XX. Cygni ...	Double star ...	618
61^1 Cygni	Binary star ...	621
4004 Arg. + 41 Cyg.	Gaseous neb.	623
1 P. XXI. Cygni ...	Double star ...	624
2107 h. Cygni ...	Cluster	625
52 Ħ. VII. Cygni ...	Cluster	631
32 Ħ. VI. Cygni ..	Nebula	632
39 M. Cygni	Cluster	634
μ Cygni	Double star ...	638

DELPHINUS.

Synonyme.	Order.	Page
16 Ħ. IV. Delph. ...	Nebula	598
178 P. XX. Delph. ...	Quadruple ...	602
103 Ħ. I. Delph. ...	Globular cl. ...	604
2703 Σ. Delph. ...	Triple star ...	606
β Delph.	Quadruple star	606
α Delph.	Star & *comites*	607
43 B. Delph.	Double star ...	610
2725 Σ. Delph. ...	Double star ...	610
γ Delph.	Double star ...	611

DORADO.

Synonyme.	Order.	Page
1237 Lac. Doradûs	Double star ...	96
2635 h. Dorad. ...	Nebula	109
α Dorad.	Star & *comes* ...	116
167 Dunl. Dorad. ...	Nebula	122
2711 h. Dorad. ...	Nebula	122
236 Dun. Dorad. ...	Cluster	125
175 Dun. Dorad. ...	Nebula	141
214 Dun. Dorad. ...	Nebula	154
219 (?) Dun. Dorad.	Nebula	158

DORADO—*continued.*

Synonyme.	Order.	Page
30 Dorad.	Looped neb. ...	160
161 (?) Dun. Dorad.	Globular cl. ...	168
194 Dun. Dorad. ...	Globular cl. ...	168
1201 Bris. Dorad. ...	Double star ...	172

DRACO.

Synonyme.	Order.	Page
288 Ħ. I. Draconis	Nebula	240
282 Ħ. I. Drac. ...	Nebula	259
79 Ħ. I. Drac. ...	Nebula	266
283 Ħ. I. Drac. . .	Nebula	270
80 Ħ. I. Drac. ...	Nebula	276
1516 Σ. Drac. ...	Double star ...	291
287 Ħ. I. Drac. ...	Nebula	306
1573 Σ. Drac. ...	Double star ...	309
263 Ħ. I. Drac. ...	Nebula	320
278 Ħ. I. Drac. ...	Nebula	320
1625 Σ. Drac. ...	Double star ...	326
264 Ħ. I. Drac. ...	Nebula	327
275 Ħ. I. Drac. ...	Nebula	330
276 Ħ. I. Drac. ...	Nebula	331
277 Ħ. I. Drac. ...	Nebula	336
274 Ħ. I. Drac. ...	Nebula	356
9 Drac.	Triple star ...	369
255 Ħ. I. Drac. ...	Nebula	393
256 Ħ. I. Drac. ...	Nebula	394
240 Ħ. I. Drac. ...	Nebula	396
α Drac.	Star & *comes* ...	398
237 Ħ. I. Drac. ...	Nebula	410
215 Ħ. I. Drac. ...	Nebula	424
102 M. (?) Drac. ...	Nebula	425
ι Drac.	Star & *comes* ...	435
764 Ħ. II. Drac. ...	Nebula	439
1984 Σ. Drac. ...	Double star ...	444
η Drac.	Star & *comes* ...	459
17 Drac.	Triple star ...	464
20 Drac.	Double star ...	477
μ Drac.	Binary star ...	481
147 P. XVII. Drac. ...	Double star ...	493
β Drac.	Star & *comes* ...	494
ν^1 Drac.	Pair of stars ...	496
41 Ħ. VI. Drac. ...	Globular cl. ...	499
2218 Σ. Drac. ...	Double star ...	501
ψ^1 Drac.	Double star ...	503
γ Drac.	Star & *comes* ...	505
37 Ħ. IV Drac. ...	Planetary neb.	512
2273 Σ. Drac. ...	Double star ...	512
2278 Σ. Drac. ...	Triple star ...	517
40 Drac.	Double star ...	522
φ Drac.	Double star ...	528
39 Drac.	Triple star ...	529
4415 H. Drac. ...	Variable neb.	529
190 B. Drac.	Double star ...	533
46 Drac.	Star & *comes* ...	539
203 B. Drac.	Double star ...	543
226 P. XVIII. Drac.	Double star ...	545
o Drac.	Double star ...	550
287 P. XVIII. Drac.	Double star ...	553
223 B. Drac.	Double star ...	554
233 B. Drac.	Double star ...	555

DRACO—*continued.*

Synonyme.	Order.	Page
δ Drac.	Star & *comes*	561
108 P. XIX. Drac.	Double star	563
2573 Σ. Drac.	Double star	572
2053 h. Drac.	Cluster	580
ε Drac.	Double star	582
30 P. XX. Drac.	Double star	589

EQUULEUS.

Synonyme.	Order.	Page
355 P. XX. Equ.	Double star	614
376 P. XX. Equ.	Double star	615
ε Equ. (1 Fl.)	Triple star	616
51 H. I. Equ.	Nebula	617
λ Equ. (2 Fl.)	Double star	617
γ Equ.	Triple star	624
δ Equ.	Triple star	625
β Equ.	Multiple star	629

ERIDANUS.

Synonyme.	Order.	Page
6 Eridani	Double star	41
2487 h. Eridani	Nebula	66
θ Eridani	Double star	77
109 H. IV. Eridani	Nebula	79
12 Eridani	Double star	81
2518 h. Eridani	Nebula	82
487 Dunl. Eridani	Globular clust.	82
6161 Lal. Eridani	Double star	83
τ^4 Eridani	Star & *comites*	83
106 H. I. Eridani	Nebula	85
548 Dunl. Eridani	Nebula	85
60 H. I. Eridani	Nebula	85
98 P. III. Eridani	Double star	88
574 Dunl. Eridani	Nebula	88
2569 h. Eridani	Globular clust.	89
107 H. I. Eridani	Nebula	90
562 Dunl. Eridani	Globular clust.	91
f Eridani	Double star	98
32 Eridani	Double star	98
γ^1 Eridani	Star & *comes*	99
510 Σ. Eridani	Double star	103
39 Eridani	Double star	104
26 H. IV. Eridani	Planetary neb.	104
40 Eridani	Ternary star	105
1419 Lac. Eridani	Double star	107
576 Σ. Eridani	Double star	117
122 H. I. Eridani	Nebula	118
55 Eridani	Double star	118
62 Eridani	Double star	120
66 Eridani	Double star	123
β Eridani	Star & *comes*	124

FORNAX.

Synonyme.	Order.	Page
122 P. II. Fornacis	Double star	66
48 H. V. Fornacis	Nebula	72
υ Fornacis	Double star	74
γ^1 Fornacis	Star & *comes*	74

GEMINI.

Synonyme.	Order.	Page
26 H. VIII. Gemin.	Cluster	167
35 M. Gemin.	Large cluster	168
135 Birm. Gemin.	Red star	171
μ Gemin.	Star & *comes*	173
15 Gemin.	Double star	175
9 H. VIII. Gemin.	Cluster	177
921 Σ. Gemin.	Double star	178
20 Gemin.	Double star	179
γ Gemin.	Triple star	181
ε Gemin.	Star & *comes*	184
38 Gemin.	Double star	191
2 H. VI. Gemin.	Cluster	192
ζ Gemin.	Triple star	195
40 H. VIII. Gemin.	Cluster	196
λ Gemin.	Double star	198
δ Gemin.	Double star	199
61 Gemin.	Dble. s. & pair	202
541 Sou. Gemin.	Double star	203
63 Gemin.	Wide dble. star	204
45 H. IV. Gemin.	Neb. s. & *comes*	204
11 H. VIII. Gemin.	Cluster	205
1108 Σ. Gemin.	Double star	206
α Gemin.	Binary star	207
1 H. VI. Gemin.	Cluster	212
κ Gemin.	Double star	217
β Gemin.	Multiple star	218
π Gemin.	Triple star	219
201 B. Gemin.	Double star	220
U Gemin.	Variable s.	221

GRUS.

Synonyme.	Order.	Page
8912 Lac. Gruis	Double star	639
3894 h. Gruis	Nebula	640
3924 h. Gruis	Nebula	644
α^2 Gruis	Double star	653
9367 Lac. Gruis	Double star	663
9446 Lac. Gruis	Double star	667

HERCULES.

Synonyme.	Order.	Page
κ^1 Herculis	Double star	448
γ Herculis	Double star	456
23 Herculis	Double star	457
136 P. XVI. Herculis	Double star	465
36 & 37 Herculis	Pair of stars	465
42 Herculis	Triple star	465
ζ Herculis	Binary star	466
13 M. Herculis	Large cluster	467
η Herculis	Star & *comes*	469
Σ. 5 N. Herculis	Planetary neb.	469
46 Herculis	Double star	470
2101 Σ. Herculis	Double star	471
50 H. IV. Herculis	Planetary neb.	472
2104 Σ. Herculis	Double star	473
167 B. Herculis	Binary star	474
210 B. Herculis	Double star	480
α Herculis	Double star	484
δ Herculis	Double star	487
68 Herculis	Double star	490

HERCULES—*continued.*

Synonyme.	Order.	Page
92 M. Herculis	Globular clust.	490
ρ Herculis	Double star	492
163 P. XVII. Herculis	Double star	497
200 P. XVII. Herculis	Double star	499
μ Herculis	Double star	501
2215 Σ. Herculis	Double star	502
1989 h. Herculis	Nebula	504
300 P. XVII. Herculis	Double star	505
95 Herculis	Double star	509
401 B. Herculis	Double star	516
100 Herculis	Double star	518
417 B. Herculis	Double star	519
110 Herculis	Double star	542
490 B. Herculis	Double star	550

HYDRA.

Synonyme.	Order.	Page
108 P. VIII. Hydræ	Double star	234
160 P. VIII. Hydræ	Double star	238
ε Hydræ	Triple star	239
15 Hydrae	Triple star	242
17 Hydræ	Double star	243
2 ♅. I. Hydræ	Nebula	246
θ Hydræ	Double star	248
65 P. IX. Hydræ	Double star	251
α Hydræ	Star & *comes*	253
τ^1 Hydræ	Wide dble. star	255
27 ♅. IV. Hydræ	Planetary neb.	271
1474 Σ. Hydræ	Triple star	278
159 P. X. Hydrae	Double star	278
68 M. Hydræ	Nebula	346
138 ♅. I. Hydræ	Nebula	374
u [R]. Hydr.	Var. s. & *comes*	381
135 P. XIII. (f) Hyd.	Double star	385
10 Hydræ	Double star	412

HYDRUS.

Synonyme.	Order.	Page
2421 h. Hydri	Nebula	37
584 Lac. Hydri	Double star	50
129 Dunlop Hydri	Cluster	136
102 Dunlop Hydri	Nebula	159
2007 Lac. Hydri	Septuple s.	160

HOROLOGIUM.

Synonyme.	Order.	Page
258 ♅. I. Horologii	Nebula	100

INDUS.

Synonyme.	Order.	Page
3828 h. Indi	Nebula	600
α Indi	Star & *comes*	605
6980 Brisb. Indi	Double star	623
3859 h. Indi	Nebula	625
406 Dunlop Indi	Nebula	626
θ Indi	Double star	626
3862 h. Indi	Nebula	629

LACERTA.

Synonyme.	Order.	Page
53 ♅. VII. Lacertæ	Cluster	644
75 ♅. VIII. Lacer.	Cluster	647

LACERTA—*continued.*

Synonyme.	Order.	Page
65 P. XXII. Lacer.	Double star	647
2 Lacertæ	Double star	648
α Lacertæ	Fine field	653
8^2 Lacertæ	Quadruple	653
10 Lacertæ	Double star	654
16 Lacertæ	Triple star	658

LEO.

Synonyme.	Order.	Page
ω Leonis	Double star	254
3 Leonis	Double star	255
56 ♅. I. Leonis	Nebula	256
57 ♅. I. Leonis	Nebula	256
6 Leonis	Double star	257
7 Leonis	Wide dble. star	257
R Leonis	Variable & red s.	260
α Leonis	Star & *comes*	264
γ Leonis	Double star	269
705 h. Leonis	Nebula	271
67 P. X. Leonis	Double star	272
49 Leonis	Double star	274
272 ♅. I. Leonis	Nebula	275
81 ♅. I. Leonis	Nebula	275
95 M. Leonis	Nebula	276
17 ♅. I. Leonis	Nebula	278
18 ♅. I. Leonis	Nebulæ	278
27 ♅. I. Leonis	Nebula	280
179 P. X. Leonis	Double star	281
54 Leonis	Double star	282
101 ♅. II. Leonis	Nebula	284
229 P. X. Leonis	Double star	288
13 ♅. I. Leonis	Nebula	288
239 P. X. Leonis	Double star	289
9 P. XI. Leonis	Double star	291
δ Leonis	Star & *comes*	292
29 ♅. I. Leonis	Nebula	293
50 ♅. II. Leonis	Nebula	294
339 B. Leonis	Double star	297
66 M. Leonis	Nebula	297
5 H. I. Leonis	Nebula	299
ι Leonis	Binary star	299
83 Leonis	Double star	302
91 P. XI. Leonis	Double star	303
88 Leonis	Double star	304
90 Leonis	Triple star	305
21 ♅. I. Leonis	Nebula	308
β Leonis	Star & *comites*	310
170 P. XI. Leonis	Double star	312

LEO MINOR.

Synonyme.	Order.	Page
200 ♅. I. Leo. M.	Nebula	241
114 ♅. I. Leo. M.	Nebula	258
26 ♅. V. Leo. M.	Nebula	260
115 ♅. I. Leo. M.	Nebula	260
86 ♅. I. Leo. M.	Nebula	273
72 ♅. I. Leo. M.	Nebula	273
164 ♅. I. Leo. M.	Nebula	274
116 ♅. I. Leo. M.	Nebula	279
362 ♅. II. Leo. M.	Nebula	280

LEO MINOR—*continued.*

Synonyme.	Order.	Page
172 ♅. I. Leo. M.	Nebula	280
87 ♅. I. Leo. M.	Nebula	283
88 ♅. I. Leo. M.	Nebula	287
351 ♅. III. Leo. M.	Nebula	290

LEPUS.

Synonyme.	Order.	Page
R. Leporis	"Crimson" star	121
ι Leporis	Double star	127
κ Leporis	Double star	128
28 Leporis	Double star	134
70 P. V. Leporis	Triple star	135
79 M. Leporis	Nebula	138
10254 Lal. Leporis	Double star	139
β Leporis	Star & *comes*	142
α Leporis	Star & *comes*	146
45 Leporis	Quintuple star	157
γ Leporis	Triple star	160

LIBRA.

Synonyme.	Order.	Page
62 P. XIV. Libræ	Double star	406
70 P. XIV. Libræ	Double star	407
α^2 Libræ	Star & *comes*	414
212 P. XIV. Libræ	Multiple star	417
18 Libræ	Double star	420
δ Libræ	Variable star	420
127 ♅. I. Libræ	Nebula	421
ι^1 Libræ	Wide dble. star	424
14 P. XV. Libræ	Wide dble. star	426
19 ♅. VI. Libræ	Cluster	427
β Libræ	Star & *comes*	428
5 M. Libræ	Large cluster	429
91 P. XV. Libræ	Double star	436
178 B. Libræ	Double star	438

LUPUS.

Synonyme.	Order.	Page
356 Dunlop Lupi	Cluster	414
5112 Brisb. Lupi	Double star	417
3585 h. Lupi	Cluster	420
3588 h. Lupi	Cluster	421
3589 h. Lupi	Cluster	421
π Lupi	Double star	422
κ Lupi	Double star	424
3594 h. Lupi	Planetary neb.	426
μ Lupi	Triple star	426
ϵ Lupi	Double star	431
357 Dunlop Lupi	Cluster	432
389 Dunlop Lupi	Globular clust.	433
5351 Brisb. Lupi	Double star	435
3607 h. Lupi	Cluster	436
γ Lupi	Double star	436
99 P. XV. (f) Lupi	Double star	436
552 Dunlop Lupi	Globular clust.	441
343 Dunlop Lupi	Cluster	442
ξ Lupi	Double star	444
η Lupi	Double star	445

LYNX.

Synonyme.	Order.	Page
4 Lyncis	Double star	172
5 Lyncis	Triple star	174
174 P. VI. Lyncis	Double star	182
12 Lyncis	Triple star	183
958 Σ. Lyncis	Double star	185
215 P. VI. Lyncis	Double star	188
14 Lyncis	Double star	190
301 P. VI. Lyncis	Double star	194
20 Lyncis	Double star	200
19 Lyncis	Triple star	200
131 P. VIII. Lyncis	Double star	236
167 ♅. I. Lyncis	Nebula	247
18289 Lal. Lyncis	Double star	249
38 Lyncis	Double star	249
113 ♅. I. Lyncis	Nebula	250
40 Lyncis	Red star	250
157 B. Lyncis	Binary star	250
39 Lyncis	Double star	251
137 ♅. I. Lyncis	Nebula	251
41 Lyncis	Pair of stars	253

LYRA.

Synonyme.	Order.	Page
α Lyræ	Star & *comes*	533
151 P. XVIII. Lyræ	Double star	536
2372 Σ. Lyræ	Double star	538
56 B. Lyræ	Double star	539
ϵ Lyræ	Multiple star	540
ζ Lyræ	Double star	542
ν^1 Lyræ	Multiple star	546
β Lyræ	Quadruple star	547
57 M. Lyræ	Nebula	548
δ Lyræ	Star & *comes*	550
91 B. Lyræ	Triple star	551
17 Lyræ	Double star	557
8 P. XIX. Lyræ	Double star	558
2470 Σ. Lyræ	Double star	558
13 P. XIX. Lyræ	Dble. dble. star	558
η Lyræ	Double star	559
56 M. Lyræ	Cluster	561

MICROSCOPIUM.

Synonyme.	Order.	Page
α Microscopii	Double star	613
θ^1 Microscopii	Double star	629

MONOCEROS.

Synonyme.	Order.	Page
4 Monocerotis	Triple star	170
5 Monoc.	Orange star	172
58 P. VI. Monoc.	Double star	173
8 Monoc.	Double star	175
104 P. VI. Monoc.	Triple star	176
10 Monoc.	Wide dble. star	176
11 Monoc.	Fine triple star	177
2 ♅. VII. Monoc.	Cluster	178
3 ♅. VIII. Monoc.	Cluster	179
14 Monoc.	Double star	180
50 ♅. VIII. Monoc.	Cluster	180
48 ♅. VIII. Monoc.	Cluster	182

MONOCEROS—*continued.*

Synonyme.	Order.	Page
15 Monoc.	Triple star	182
31 H. VIII. Monoc.	Cluster	189
27 H. VI. Monoc.	Cluster	191
50 M. Monoc.	Double star	195
33 H. VIII. Monoc.	Dble. s. in clus.	196
34 H. VIII. Monoc.	Double star	198
116 P. VII. Monoc.	Quintuple star	205
52 H. VIII. Monoc.	Cluster	210
1183 Σ. Monoc.	Double star	224
29 Monoc.	Triple star	226
22 H. VI. Monoc.	Double star	230
81 P. VIII. Monoc.	Double star	232

MUSCA.

Synonyme.	Order.	Page
262 H. I. Muscæ	Nebula	301
3921 Brisb. Muscæ	Double star	318
164 Dunl. Muscæ	Globular clust.	367
θ Muscæ	Double star	370

NORMA.

Synonyme.	Order.	Page
ι^1 Normæ	Double star	445
359 Dun. Normæ	Cluster	448
360 Dun. Normæ	Cluster	449
326 Dun. Normæ	Cluster	451
3625 h. Normæ	Cluster	455
5708 Brisb. Normæ	Double star	455
ε Normæ	Double star	458
412 Dun. Normæ	Cluster	458
536 Dun. Normæ	Nebula	458
400 Dun. Normæ	Cluster	462
5770 Brisb. Normæ	Double star	463

OCTANS.

Synonyme.	Order.	Page
232 Dun. Octantis	Double star	602
8511 Lac. Octantis	Double star	620
λ Octantis	Double star	636

OPHIUCHUS.

Synonyme.	Order.	Page
ρ Ophiuchi	Double star	457
88 P. XVI. Ophiuchi	Double star	461
λ Ophiuchi	Binary star	461
40 H. VI. Ophiuchi	Cluster	462
12 M. Ophiuchi	Cluster	470
19 Ophiuchi	Double star	471
2106 Σ. Ophiuchi	Double star	473
10 M. Ophiuchi	Cluster	475
397 Birm. Ophiuchi	Temp. s. 1848	476
19 M. Ophiuchi	Globular clust.	477
270 P. XVI. Ophi.	Double star	479
11 H. VI. Ophi.	Globular clust.	479
195 H. II. Ophi.	Globular clust.	480
124 B. Ophi.	Double star	480
12 H. VI. Ophi.	Globular clust.	481
147 H. I. Ophi.	Globular clust.	481
36 Ophi.	Multiple star	482
45 H. I. Ophi.	Globular clust.	486
39 Ophi.	Double star	488

OPHIUCHUS—*continued.*

Synonyme.	Order.	Page
9 M. Ophi.	Globular clust.	489
48 H. I. Ophi.	Globular clust.	491
94 P. XVII. Ophi.	Double star	492
11 H. IV. Ophi.	Nebula	493
2166 Σ. Ophi.	Double star	493
54 Ophi.	Double star	495
53 Ophi.	Wide dble. star	495
α Ophi.	Star & *comes*	495
14 M. Ophi.	Globular clust.	497
6 M. Ophi.	Cluster	498
2191 Σ. Ophi.	Double star	499
61 Ophi.	Double star	500
23 M. Ophi.	Cluster	504
67 Ophi.	Double star	508
τ Ophi.	Binary star	510
70 Ophi.	Binary star	513
73 Ophi.	Double star	518

ORION.

Synonyme.	Order.	Page
258 P. IV. Orionis	Double star	120
627 Σ. Orionis	Double star	122
278 P. IV. Orionis	Double star	122
96 Birm. Orionis	Red star	123
652 Σ. Orionis	Double star	127
ρ^1 Orionis	Double star	127
β Orionis	Double star	130
τ Orionis	Quadruple star	134
23 Orionis	Double star	135
700 Σ. Orionis	Double star	135
88 B. Orionis	Double star	136
η Orionis	Double star	136
γ Orionis	Star & *comes*	137
84 P. V. Orionis	Double star	138
ψ^2 Orionis	Double star	139
109 P. V. Orionis	Double star	141
31 Orionis	Double star	142
32 Orionis	Double star	143
33 Orionis	Double star	144
δ Orionis	Wide dble. star	144
λ Orionis	Double star	148
743 Σ. Orionis	Double star	148
133 B. Orionis	Double star	148
θ^1 Orionis	Mult. s. & neb.	149
ι Orionis	Triple star	152
362 h. Orionis	Dble. star & cl.	153
43 M. Orionis	Nebula	153
ε Orionis	Star & *comes*	154
158 B. Orionis	Double star	155
757 Σ. Orionis	Double star	155
σ Orionis	Multiple star	156
ζ Orionis	Triple star	158
34 H. IV. Orionis	Planetary neb.	158
187 B. Orionis	Double star	161
78 M. Orionis	Nebula	161
52 Orionis	Double star	162
809 Σ. Orionis	Double star	163
816 Σ. Orionis	Double star	163
α Orionis	Star & *comes*	164
59 Orionis	Star & *comes*	167

ORION—*continued.*

Synonyme.	Order.	Page
855 Σ. Orionis	Double star	169
24 ♅. VIII. Orionis	Cl. with triple s.	170
859 Σ. Orionis	Double star	170
25 ♅. VII. Orionis	Cl. with dble. s.	171

PAVO.

Synonyme.	Order.	Page
225 Dun. Pavonis	Globular clust.	493
3757 h. Pavonis	Nebula	538
262 Dun. Pavonis	Nebula	556
295 Dun. Pavonis	Globular clust.	557
6780 Brisb. Pavonis	Double star	586
8550 Lac. Pavonis	Double star	612

PEGASUS.

Synonyme.	Order.	Page
γ Pegasi	Star & *comes*	5
1 Pegasi	Double star	628
2797 Σ. Pegasi	Double star	630
20 B. Pegasi	Double star	630
15 M. Pegasi	Cluster	630
29 B. Pegasi	Binary star	634
3 Pegasi	Double star	634
ε Pegasi	Star & *comites*	637
κ Pegasi	Double star	638
312 P. XXI. Pegasi	Double star	640
42827 Lal. Pegasi	Double star	641
20 Pegasi	Double star	642
148 B. Pegasi	Double star	646
33 P. XXII. Pegasi	Double star	646
33 Pegasi	Triple star	649
37 Pegasi	Double star	651
53 ♅. I. Pegasi	Nebula	654
ζ Pegasi	Star & *comes*	654
η Pegasi	Star & *comes*	655
ξ Pegasi	Dble. s. & *comes*	656
β Pegasi	Star & *comes*	661
α Pegasi	Star & *comes*	661
55 ♅. I. Pegasi	Nebula	662
306 P. XXII. Pegasi	Double star	663
57 Pegasi	Double star	664
2276 h. Pegasi	Cluster	673
216 P. XXIII. Pegasi	Double star	674

PERSEUS.

Synonyme.	Order.	Page
76 M. Persei	Nebula	40
χ Persei	Triple star	59
33 ♅. VI. Persei	Fine cluster	60
227 h. Persei	Cluster	65
156 ♅. I. Persei	Nebula	67
34 M. Persei	Cl. with dble. s.	68
12 Persei	Star & pair	69
θ Persei	Triple star	70
η Persei	Double star	73
85 B. Persei	Double star	75
20 Persei	Double star	75
220 P. II. Persei	Double star	77
104 B. Persei	Double star	77
β Persei	Star & *comes*	79
25 ♅. VI. Persei	Cluster	81
369 Σ. Persei	Double star	82
37 P. III. Persei	Orange star	83
α Persei	Star & *comes*	83
88 ♅. VIII. Persei	Cluster	86
425 Σ. Persei	Double star	88
40 Persei	Double star	90
443 Σ. Persei	Double star	92
80 ♅. VIII. Persei	Double star	96
ζ Persei	Quadruple star	98
ε Persei	Double star	99
60 ♅. VII. Persei	Group of stars	101
μ Persei	Star & *comes*	103
61 ♅. VII. Persei	Cluster	104
533 Σ. Persei	Double star	109
552 Σ. Persei	Double star	112
57 Persei	Wide pair	112
58 Persei	Star & pair	113

PHŒNIX.

Synonyme.	Order.	Page
2315 h. Phœnicis	Nebula	6
3395 *h. Phœnicis	Double star	19
294 Lac. Phœnicis	Double star	25
β Phœnicis	Star & *comes*	26
ζ Phœnicis	Double star	28
2426 h. Phœnicis	Nebula	39
3999 h. Phœnicis	Nebula	670
θ Phœnicis	Double star	671
4006 h. Phœnicis	Nebula	673

PICTORIS.

Synonyme.	Order.	Page
ι Pictoris	Double star	119
2145 Lac. Pictoris	Double star	168

PISCES.

Synonyme.	Order.	Page
34 Piscium	Double star	4
35 Piscium	Double star	5
38 Piscium	Double star	6
42 Piscium	Double star	7
49 Piscium	Double star	9
51 Piscium	Double star	10
52 Piscium	Double star	11
55 Piscium	Double star	13
65 Piscium	Double star	21
251 P. O. Piscium	Double star	23
ψ^1 Piscium	Double star	25
77 Piscium	Double star	25
φ Piscium	Double star	29
ζ Piscium	Double star	29
108 ♅. I. Piscium	Nebula	31
151 ♅. I. Piscium	Nebula	35
85 P. I. Piscium	Star & *comes*	36
100 Piscium	Double star	38
123 P. I. Piscium	Double star	40
74 M. Piscium	Globular clust.	40
145 P. I. Piscium	Double star	41
155 Σ. Piscium	Double star	43

PISCES—*continued.*

Synonyme.	Order.	Page
209 P. I. Piscium	Double star	49
α Piscium	Double star	52
430 Ⱨ. II. Piscium	Nebula	665
3009 Σ. Piscium	Double star	667
179 P. XXIII. Piscium	Double star	672

PISCIS AUSTRALIS.

3090 h. Pis. Aus.	Nebula	641
3908 h. Pis. Aus.	Nebula	642
9046 Lac. Pis. Aus.	Double star	645
β Pis. Aus.	Double star	652
γ Pis. Aus.	Double star	657
δ Pis. Aus.	Double star	658
α Pis. Aus.	Star & *comes*	659

PISCIS VOLANTIS.

γ Piscis Volantis	Double star	198
3010 Lac. Pis. Vol.	Double star	219
ζ Pis. Vol.	Double star	221
ε Pis. Vol.	Double star	230

PYXIS NAUTICA.

63 Ⱨ. VII. Pyx. Nau.	Cluster	234
59 Ⱨ. I. Pyx. Nau.	Nebula	247
564 Dun. Pyx. Nau.	Nebula	249

RETICULUM.

1069 Lac. Reticuli	Double star	82
θ Reticuli	Double star	108
1551 Lac. Ret.	Double star	117
1583 Lac. Ret.	Double star	118

SAGITTA.

ε Sagittæ	Star & *comes*	568
ζ Sagittæ	Double star	577
71 M. Sagittæ	Cluster	583
χ Sagittæ	Orange star	586
θ Sagittæ	Triple star	590

SAGITTARIUS.

612 Dun. Sagittarii	Cluster	500
3702 a h. Sagit.	Cluster	500
597 (?) Dun. Sagit.	Cluster	502
13 Ⱨ. VI. Sagit.	Cluster	503
7 M. Sagit.	Cluster	503
294 P. XVII. Sagit.	Double star	505
20 M. Sagit.	Large neb.	508
49 Ⱨ. I. Sagit.	Globular clust.	509
8 M. Sagit.	Nebula	511
3725 h. Sagit.	Cluster	511
21 M. Sagit.	Cluster	511
3729 h. Sagit.	Cluster	517
3731 h. Sagit.	Globular clust.	518
54 Ⱨ. VIII. Sagit.	Cluster	519

SAGITTARIUS—*continued.*

Synonyme.	Order.	Page
30 Ⱨ. VII. Sagit.	Cluster	519
μ^1 Sagit.	Multiple star	520
η Sagit.	Double star	523
50 Ⱨ. I. Sagit.	Globular clust.	527
28 M. Sagit.	Globular clust.	528
51 Ⱨ. I. Sagit.	Globular clust.	530
69 M. Sagit.	Globular clust.	530
25 M. Sagit.	Cluster	530
23 Ⱨ. VI. Sagit.	Cluster	531
607 Dunl. Sagit.	Nebula	531
22 M. Sagit.	Globular clust.	532
70 M. Sagit.	Cluster	537
54 M. Sagit.	Globular clust.	548
573 Dun. Sagit.	Globular clust.	552
8028 Lac. Sagit.	Double star	559
2034 h. Sagit.	Nebula	560
43 P. XIX. Sagit.	Double star	560
β^1 Sagit.	Double star	562
5112 *h. Sagit.	Quadruple star	563
505 Birm. Sagit.	Red star	568
54 Sagit.	Triple star	570
51 Ⱨ. V. Sagit.	Planetary neb.	571
75 M. Sagit.	Globular clust.	587
κ^2 Sagit.	Double star	598
3841 h. Sagit.	Nebula	612
8809 Lac. Sagit.	Double star	630

SCORPIO.

ξ Scorpii [51 Lib.]	Triple star	446
β Scorpii	Star & *comes*	447
6706 Lac. Scorpii	Double star	448
ν Scorpii	Quadruple star	449
80 M. Scorpii	Cluster	451
48 P. XVI. Scorpii	Double star	454
σ Scorpii	Double star	455
6815 Lac. Scorpii	Double star	455
4 M Scorpii	Cluster	456
60 P. XVI. Scorpii	Double star	457
α Scorpii	Star & *comes*	459
6909 Lac. Scorpii	Double star	472
499 Dun. Scorpii	Cluster	474
520 Dun. Scorpii	Cluster	474
236 P. XVI. Scorpii	Double star	475
456 Dun. Scorpii	Cluster	476
62 M. Scorpii	Nebula	476
3662 h. Scorpii	Cluster	477
556 Dun. Scorpii	Cluster	479
522 Dun. Scorpii	Cluster	486
31 Scorpii = 38 Oph.	Double star	487
3673 h. Scorpii	Cluster	488
3680 h. Scorpii	Annular neb.	491
457 Dun. Scorpii	Cluster	494
568 Dun. Scorpii	Cluster	498

SCULPTOR.

ξ Sculptoris	Double star	11
20 Ⱨ. VI. Sculp.	Globular clust.	22
404 Lac. Sculp.	Double star	36

SCULPTOR—*continued.*

Synonyme.	Order.	Page
281 Ħ. I. Sculp.	Nebula	39
ϵ Sculp.	Double star	43
1464 Lac. Sculp.	Double star	111
2666 h. Sculp.	Nebula	118
531 (?) Dun. Sculp.	Nebula	124
4005 h. Sculp.	Nebula	673

SERPENS.

Synonyme.	Order.	Page
128 Ħ. I. Serpentis	Nebula	423
1931 Σ. Serpentis	Double star	430
5 Serpentis	Double star	430
148 Ħ. I. Serpentis	Nebula	431
76 P. XV. Serpentis	Double star	434
δ Serpentis	Double star	437
α Serpentis	Star & *comes*	441
β Serpentis	Double star	442
39 Serpentis	Isolated star	443
220 P. XV. Serpentis	Double star	444
2007 Σ. Serpentis	Double star	448
2017 Σ. Serpentis	Double star	449
49 Serpentis	Double star	450
ν Serpentis	Double star	490
59 Serpentis	Double star	528
θ^1 Serpentis	Double star	551

SEXTANS.

Synonyme.	Order.	Page
61 Ħ. I. Sextantis	Nebula	258
161 P. IX. Sex.	Double star	258
9 Sextantis	Double star	261
163 Ħ. I. Sex.	Nebula	264
3 Ħ. I. Sextantis	Nebula	266
4 Ħ. I. Sextantis	Nebula	267
94 P. X. Sextantis	Double star	273
35 Sextantis	Double star	275
41 Sextantis	Triple star	279

TAURUS.

Synonyme.	Order.	Page
401 Σ. Tauri	Double star	87
7 Tauri	Triple star	87
58 Ħ. I. Tauri	Nebula	89
34 B. Tauri	Double star	89
39 B. Tauri	Triple star	90
19 Pleiadum	Double star	91
15 Pleiadum	Double star	91
768 H. Tauri	Variable neb.	92
23 Pleiadum	Star & pair	92
η Tauri	Star & *comes*	93
30 Tauri	Double star	96
27 Pleiadum	Star & *comes*	97
213 P. III. Tauri	Triple star	100
179 B. Tauri	Double star	101
69 Ħ. IV. Tauri	Nebulous star	102
γ Tauri	Star & *comes*	105
ϕ Tauri	Wide dble. star	106
839 H. Tauri	Variable neb.	107
χ Tauri	Double star	108
62 Tauri	Double star	109
κ^1 Tauri	Pair of stars	109
548 Σ. Tauri	Double star	110
θ^1 Tauri	Pair	110
80 Tauri	Double star	111
559 Σ. Tauri	Double star	112
α Tauri	Star & *comes*	113
88 Tauri	Star & *comes*	115
σ^1 Tauri	Pair of stars	117
τ Tauri	Star & *comes*	117
257 P. IV. Tauri	Double star	121
295 P. IV. Tauri	Double star	124
4 Ħ. VII. Tauri	Double star	126
20 P. V. Tauri	Double star	131
25 P. V. Tauri	Double star	132
37 P. V. Tauri	Double star	134
111 Tauri	Star & *comes*	136
β Tauri	Star & *comes*	137
118 Tauri	Double star	141
730 Σ. Tauri	Double star	144
1 M. Tauri	"Crab nebula"	145
380 B. Tauri	Double star	149
749 Σ. Tauri	Double star	154
124 Tauri	Quadruple star	156
785 Σ. Tauri	Double star	159

TAURUS PONIATOWSKII.

Synonyme.	Order.	Page
9 B. Tauri P.	Double star	505
362 P. XVII. Tauri P.	Double star	516
6 Σ. N. Tauri P.	Planetary neb.	520
55 Tauri P.	Double star	533
75 B. Tauri P.	Double star	539
78 B. Tauri P.	Double star	546

TELESCOPIUM.

Synonyme.	Order.	Page
557 Dun. Telescopii	Globular clust.	502
460 (?) Dun. Tel.	Nebula	504
473 Dun. Tel.	Globular clust.	516
376 Dun. Tel.	Globular clust.	523
6385 Brisb. Tel.	Double star	528
8227 Lac. Tel.	Double star	577
3814 h. Tel.	Nebula	588

TOUCANUS.

Synonyme.	Order.	Page
47 Toucani	Large cluster	8
β Toucani	Double star	10
2367 h. Toucani	Globular clust.	23
κ Toucani	Double star	30
δ Toucani	Double star	650
3995 h. Toucani	Nebula	669

TRIANGULUM.

Synonyme.	Order.	Page
33 M. Trianguli	Nebula	38
α Trianguli	Star & *comes*	46
197 Σ. Trianguli	Double star	51
ϵ Trianguli	Double star	53
ι Trianguli	Double star	58

TRIANGULUM—*continued.*

Synonyme.	Order.	Page
28 B. Trianguli	Double star	59
38 & 39 P. II. Triang.	Double star	60
13 Trianguli	Double star	64
160 P. II. Trianguli	Double star	72

TRIANGULUM AUSTRALIS.

Synonyme.	Order.	Page
6477 Lac. Tri. Aus.	Double star	440
4809 *h. Tri. Aus.	Triple star	443
304 Dun. Tri. Aus.	Cluster	445

URSA MAJOR.

Synonyme.	Order.	Page
242 ♅. I. Urs. Maj.	Nebula	241
ι Ursæ Majoris	Double star	243
249 ♅. I. Urs. Maj.	Nebula	245
σ^2 Ursæ Majoris	Double star	245
250 ♅. I. Urs. Maj.	Nebula	246
216 ♅. I. Urs. Maj.	Nebula	248
205 ♅. I. Urs. Maj.	Nebula	250
21 Urs. Maj.	Double star	252
260 ♅. I. Urs. Maj.	Nebula	252
23 Urs. Maj.	Double star	255
285 ♅. I. Urs. Maj.	Nebula	259
78 ♅. I. Urs. Maj.	Nebula	259
81 & 82 M. Urs. Maj.	Nebula	261
286 ♅. I. Urs. Maj.	Nebula	262
47 ♅. V. Urs. Maj.	Nebula	263
1402 Σ. Urs. Maj.	Double star	263
1415 Σ. Urs. Maj.	Double star	268
199 ♅. I. U. Maj.	Nebula	268
266 ♅. I. U. Maj.	Nebula	269
58 P. X. Urs. Maj.	Double star	271
60 ♅. IV. U. Maj.	Planetary neb.	274
267 ♅. I. U. Maj.	Nebula	281
268 ♅. I. U. Maj.	Nebula	281
1495 Σ. Urs. Maj.	Double star	282
β Urs. Maj.	Star & *comes*	284
α Urs. Maj.	Star & *comes*	285
220 ♅. I. U. Maj.	Nebula	290
46 ♅. V. U. Maj.	Nebula	290
97 M. Urs. Maj.	Planetary neb.	292
234 B. Urs. Maj.	Double star	293
270 ♅. I. U. Maj.	Nebula	294
271 ♅. I. U. Maj.	Nebula	294
ξ Ursæ Majoris	Binary star	294
ν Ursæ Majoris	Double star	296
226 ♅. I. U. Maj.	Nebula	298
219 ♅. I. U. Maj.	Nebula	300
194 ♅. I. U. Maj.	Nebula	301
246 ♅. I. U. Maj.	Nebula	302
247 ♅. I. U. Maj.	Nebula	302
57 Ursæ Majoris	Double star	303
221 ♅. I. U. Maj.	Nebula	304
222 ♅. I. U. Maj.	Nebula	305
111 P. XI. U. Maj.	Triple star	306
284 B. Urs. Maj.	Double star	307
290 B. Urs. Maj.	Double star	307
94 ♅. I. U. Maj.	Nebula	308
201 ♅. I. U. Maj.	Nebula	308

URSA MAJOR—*continued.*

Synonyme.	Order.	Page
248 ♅. I. U. Maj.	Nebula	309
228 ♅. I. U. Maj.	Nebula	309
82 ♅. I. U. Maj.	Nebula	310
203 ♅. I. U. Maj.	Nebula	311
173 ♅. I. U. Maj.	Nebula	312
251 ♅. I. U. Maj.	Nebula	313
202 ♅. I. U. Maj.	Nebula	313
45 ♅. V. U. Maj.	Nebula	313
65 Ursæ Majoris	Triple star	314
62 ♅. IV. U. Maj.	Planetary neb.	315
223 ♅. I. U. Maj.	Nebula	315
253 ♅. I. U. Maj.	Nebula	316
252 ♅. I. U. Maj.	Nebula	316
224 ♅. I. U. Maj.	Nebula	317
206 ♅. I. U. Maj.	Nebula	317
207 ♅. I. U. Maj.	Nebula	318
225 ♅. I. U. Maj.	Nebula	318
195 ♅. I. U. Maj.	Nebula	319
1603 Σ. U. Maj.	Double star	320
δ Ursæ Majoris	Star & *comes*	324
209 ♅. I. U. Maj.	Nebula	326
43 ♅. V. U. Maj.	Nebula	329
254 ♅. I. U. Maj.	Nebula	348
243 ♅. I. U. Maj.	Nebula	364
417 B. Urs. Maj.	Double star	366
ζ Ursæ Majoris	Double star	378
113 P. XIII. U. M.	Double star	382
156 P. XIII. U. M.	Double star	388
η Ursæ Majoris	Star & *comes*	392
277 P. XIII. U. M.	Double star	397

URSA MINOR.

Synonyme.	Order.	Page
α Ursæ Minoris	Double star	32
5 Ursæ Minoris	Double star	409
β Ursæ Minoris	Star & *comes*	418
π^1 Ursæ Minoris	Double star	439
π^2 Ursæ Minoris	Double star	443
ε Ursæ Minoris	Star & *comes*	478
δ Ursæ Minoris	Star & *comes*	522

VIRGO.

Synonyme.	Order.	Page
126 P. XI. Virginis	Double star	307
121 ♅. I. Virginis	Nebula	315
33 ♅. I. Virginis	Nebula	319
59 B. Virginis	Triple star	320
9 ♅. I. Virginis	Nebula	323
98 M. Virginis	Nebula	323
35 ♅. I. Virginis	Nebula	325
32 P. XII. Virginis	Double star	327
99 M. Virginis	Spiral neb.	329
61 M. Virginis	Nebula	331
17 Virginis	Double star	332
100 M. Virginis	Nebula	333
123 ♅. I. Virginis	Nebula	334
30 ♅. I. Virginis	Nebula	334
22 ♅. I. Virginis	Nebula	335
84 M. Virginis	Nebula	335
86 M. Virginis	Nebula	336

VIRGO—*continued.*

Synonyme.	Order.	Page
28 *a* ♅. I. Virginis	Nebula	337
161 ♅. I. Virginis ...	Nebula	338
49 M. Virginis ...	Nebula	338
87 M. Virginis ...	Nebula	340
88 M. Virginis ...	Nebula	340
31 ♅. I. Virginis ...	Nebula	342
160 ♅. I. Virginis ...	Nebula	344
36 ♅. I. Virginis ...	Nebula	344
89 M. Virginis ...	Nebula	344
32 ♅. I. Virginis ...	Nebula	345
90 M. Virginis ...	Nebula	346
58 M. Virginis ...	Nebula	346
143 P. XII. Virginis	Double star ...	346
43 ♅. I. Virginis ...	Nebula	347
21 ♅. I. Virginis ...	Nebula	347
γ Virginis	Binary star ...	349
59 M. Virginis ...	Nebula	355
10 ♅. I. Virginis ...	Nebula	356
60 M. Virginis ...	Nebula	356
142 ♅. I. Virginis ...	Nebula	358
15 ♅. I. Virginis ...	Nebula	358
1678 Σ. Virginis ...	Double star ...	359
39 ♅. I. Virginis ...	Nebula	360
129 ♅. I. Virginis ...	Nebula	360
196 P. XII. Virginis	Double star ...	360
25 ♅. I. Virginis ...	Nebula	361
75 ♅. II. Virginis ...	Nebula	362
134 ♅. I. Virginis ...	Nebula	364
221 P. XII. Virginis	Double star ...	364
162 ♅. I. Virginis ...	Nebula	367
44 Virginis	Double star ...	368
143 ♅. I. Virginis ...	Nebula	368
ε Virginis	Star & *comes*...	369
130 ♅. I. Virginis ...	Nebula	370
θ Virginis	Triple star ...	371
54 Virginis	Double star ...	373
25 P. XIII. Virginis	Wide dble. star	374
a Virginis	Star & *comes*	376
72 Virginis	Double star ...	382
127 P. XIII. Virginis	Binary star ...	384
81 Virginis	Double star ...	386
34 ♅. I. Virginis ...	Nebula	386
297 ♅. II. Virginis ...	Nebula	386
84 Virginis	Double star ...	390
171 P. XIII. Virginis	Double star ...	390
238 P. XIII. Virginis	Double star ...	395
6 ♅. I. Virginis ...	Nebula	396
144 ♅. I. Virginis ...	Nebula	405
146 ♅. I. Virginis ...	Nebula	406
φ Virginis	Double star ...	408
70 ♅. I. Virginis ...	Nebula	408
95 P. XIV. Virginis ...	Double star ...	409
182 ♅. I. Virginis ...	Nebula	411
126 ♅. I. Virginis ...	Nebula	412

VULPECULA.

Synonyme.	Order.	Page
1 B. Vulpeculæ ...	Double star ...	556
2504 Σ. Vul.	Double star ...	563
6 & 8 Vulpeculæ ...	Star & *comes*...	565
14 ♅. VI. Vul. ...	Cluster	566
2046 h. Vul.	Cluster	570
11 Vulpeculæ	Anth.'s temp. st.	576
9 ♅. VII. Vulpeculæ	Cluster	581
320 P. XIX. Vul. ...	Double star ...	582
27 M. Vulpeculæ	"Dumb-bell neb."	585
415 P. XIX. Vul. ...	Double star ...	588
113 P. XX. Vul. ...	Double star ...	599
94 B. Vulpeculæ ...	Double star ...	603
2769 Σ. Vul.	Double star ...	624

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